Earth Mechanics

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SUBCONTRACTOR REPORTS FINAL GEOTECHNICAL SITE CHARACTERIZATION

SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT

VOLUME 3 OF 3
(Fugro West, Inc.)

Prepared for

CALIFORNIA DEPARTMENT OF TRANSPORTATION

March 2001

Earth Mechanics

Fugro - Earth Mechanics
A JOINT VENTURE

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March 5, 2001
Project No. 98-42-0054

California Department of Transportation
Engineering Service Center
Office of Structural Foundations
5900 Folsom Boulevard
Sacramento, California 95819-0128

Attention: Mr. Mark Willian
Contract Manager

Subcontractor Reports
Final Geotechnical Site Characterization
SFOBB East Span Seismic Safety Project

Dear Mr. Willian:

The geologic and geotechnical studies for the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety are being conducted by Fugro-Earth Mechanics (a joint venture of Fugro West, Inc., and Earth Mechanics, Inc.) under California Department of Transportation (Caltrans) Contract 59A0053. Phase 2 of the studies included 30 marine borings drilled from September through November 1998 per the requirements of Task Order No. 5 of the referenced contract. The borings included extensive in situ testing, soil sampling, rock coring, and downhole geophysical logging. Extensive laboratory testing programs were conducted on the soil samples and rock cores recovered from the borings.

As part of the execution of the final geotechnical site investigations, services were obtained from several subcontractors who have submitted reports to Fugro-Earth Mechanics documenting the data they collected. Those reports are reproduced in a set of three volumes that include the following subcontractor reports:

Volume	Subcontractor	Report Subject
1	• Geovision • Welenco, Inc.	• Borehole Geophysics • Borehole Televiewer Logs
2	• GeoTest Unlimited	• Laboratory Rock Testing Program
3	• Fugro West, Inc.	• Tethered Seascout Soundings

On behalf of the project team, we appreciate the opportunity to contribute to the Caltrans' design of the new bridge to replace the existing SFOBB East Span. Please call if we can answer any questions relative to the information presented in the enclosed report.

Sincerely,

FUGRO-EARTH MECHANICS, A Joint Venture

Thomas W. McNeilan, C.E., G.E.
Vice President

TWM:cab

Attachment

Copies Submitted: Mr. Mark Willian, Caltrans
Mr. Saba Mohan, Caltrans
Mr. Robert Price, Caltrans
Dr. Brian Maroney, Caltrans
Ms. Sharon Naramore, Caltrans
Mr. Gerry Houlahan, TY Lin/M&N
Mr. Sajid Abbas, TY Lin/M&N
Mr. Al Ely, TY Lin/M&N

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
CALTRANS CONTRACT 59A0053

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5900 Folsom Boulevard
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Prepared By:

FUGRO-EARTH MECHANICS
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Tel: (805) 650-7000
Fax: (805) 650-7010

May 14, 1999
Project No. 98-42-0054

Fugro-Earth Mechanics, a Joint Venture
7700 Edgewater Drive, Suite 848
Oakland, California 94621

Attention: Mr. Thomas W. McNeilan

In Situ Tethered Cone Penetration Test Results
Marine Geotechnical Site Characterization
SFOBB East Span Seismic Safety Project

Dear Mr. McNeilan:

This letter report presents the results of 57 tethered cone penetration test (CPT) soundings performed around and along the proposed N6 skyway alignment. This letter represents the execution of additional services performed for Task Order No. 5 of the above project. The field exploration activities using the Seascout, described in this report, were conducted during the week of December 14 to 19, 1998.

Introduction

Purpose of Soundings. Tethered Seascout CPT soundings were conducted principally to supplement existing land data and adjacent offshore boring data to further characterize the conditions of the shallow tidal flat sediments to the north of the Oakland Mole approach. The Seascout was considered an ideal tool as it can be deployed from smaller vessels (e.g., geophysical survey vessels). As these soundings could only be performed during periods of high tide, additional testing was conducted during periods of low tides along the N6 skyway alignment. Tethered Seascout CPT soundings supplement existing offshore boring data to further characterize the conditions of the near surface sediments in this area.

Almost 100 Seascout CPT soundings were conducted along the N6 northern alignment. About half of the soundings were performed west of the Oakland Mole along the proposed N6 alignment. Fifty seven (57) of those soundings were numbered 98-401 to 98-454, 98-501, 98-505, and 98-506. Soundings were performed at specific pier locations and close to offshore marine borings. The remaining soundings (designated 98-502 to 98-560), were conducted on the tidal and mud flat to the north of the Oakland Mole. Seasonal high tides during the week of December 14 to 19, 1998, allowed access into otherwise un-navigable water depths during lower tides north of the Oakland Mole. Details of these soundings are described in the report submitted to the California Department of Transportation (Fugro-EMI, 1999). Plate 1 shows the extent of the soundings included in this report.

Description of Seascout CPT. Fugro's Seascout is a lightweight seafloor CPT system designed for tethered deployment from a modest-sized vessel. The Seascout CPT includes: a 2.4-meter-high (8-foot-high) triangular reaction frame with a 2-meter (6-2/3-foot) base dimension, a patented hydraulic thrust mechanism, a coiled CPT rod with spooling/straightening device, a miniature piezocone, and associated data storage/processing computer. The weight of the Seascout frame in water is about 1,360 kilograms (3,000 pounds).

As deployed along the proposed N6 northern alignment, the system has a maximum penetration of 5.2 meters (17 feet). The basis of the lightweight design is a miniature cone penetrometer with a 100-mm^2 cone base area, rather than the conventional 1,000 mm^2. This results in a substantial reduction of the thrust and the reaction equipment requirements.

Cone penetration tests involve the in situ measurement of the resistance of soil to continuous penetration of push rods having a cone at the base. The measurements comprise penetration depth, cone resistance, sleeve friction, pore pressure, and inclination from vertical. Use of the coiled CPT tube provides a continuous penetration push as opposed to a stroke-based penetration when using the more common 0.9-meter (3-foot-long) CPT rod segments.

In Situ CPT Sounding Methods and Equipment

Seascout Apparatus. The Seascout apparatus (including a thrust machine, a coiled push rod system, and a penetrometer) is described below:

- **Thrust Machine** - Apparatus providing thrust to the coiled push rod system so that the required constant rate of penetration is controlled (underwater hydraulic power pack and patented wheeldrive thrust).
- **Reaction Equipment** - Reaction for the thrust machine (e.g., ballasted seabed frame, remote operated vehicle, sled).
- **Coiled Push Rod System** - Thick-walled cylindrical tube used for advancing the penetrometer to the required test depth, straightened upon penetration and coiled upon extraction.
- **Push Rod Casing** - Guide for the part of the push rod protruding above the soil and/or for the push rod length exposed in water or soil. The casing prevents buckling when the required penetration pressure increases beyond the safe limit for the exposed upstanding length of the push rod.
- **Piezocone Penetrometer (PCPT)** - Cylindrical terminal body mounted on the lower end of the push rods, including a cone, a friction sleeve, a filter and internal sensing

devices for the measurement of cone resistance, sleeve friction, pressure, and (optionally) inclination.

- **Measuring System** - Apparatus and software, including sensors, data transmission apparatus, recording apparatus, and data processing apparatus.

Photographs taken during the deployment and subsequent retrieval of the Seascout are shown on Plate 2.

Vessel. The SFOBB East Span Seismic Safety Project CPT soundings were conducted from the *M/V White Lightning*, a 50-foot workboat owned and operated by West Coast Sea Works. The Seascout was deployed off the sides of the vessel using a deck-mounted, hydraulically-operated crane. Station keeping was accomplished by "live-boating" over the location using vessel power.

Navigation. CPT locations were determined using Fugro's Differential Global Positioning System (DGPS), referenced to known base stations in the San Francisco Bay area. Coordinates calculated from the DGPS system are considered accurate to within about 1 meter (3 feet). Coordinates for the CPT locations are reported relative to the California State Plane, Zone 3, NAD83 meters datum.

Procedure. The test procedure at each location included the following steps:

1. Positioning of vessel and Seascout at test location.
2. Lowering of Seascout frame to the mudline.
3. Advancement of the cone into the harbor bottom to the maximum 5.2-meter (17-foot) penetration or refusal.
4. Retraction of the cone rods and penetrometer.
5. Retrieval of the frame to the aft deck of the vessel, and moving to the next test location.
6. Data processing onboard the vessel.

All data were acquired digitally for subsequent computer-based processing (both on the vessel and later in the office) and presentation.

Water Depth Measurement. Water depths at each CPT location were measured with a sounding tape and using the MV White Lightning's built in echo sounder. The penetration of the Seascout unit itself into the seafloor was determined by measuring the amount of mud remaining on the equipment upon retrieval. The measured water depths were corrected to MSL datum using the published tide charts for the nearby Yerba Buena Island or Matson Wharf.

Data Processing and Presentation of Results

The raw CPT sounding data were processed using Fugro processing algorithms (UNIPLOT) developed for offshore CPT data processing. For each sounding, we present plots of cone point resistance, sleeve friction, friction ratio, and pore pressure. The friction ratio is defined as the ratio of the friction sleeve value to the cone point resistance. The Seascout CPT sounding data are enclosed in this report as plates 98-401 through 98-454 for the soundings along the N6 skyway alignment and 98-501, 98-505, and 506 for soundings north of the Oakland Mole adjacent to marine boring 98-44.

Stratigraphy and Material Properties

Stratigraphy. The materials penetrated in the CPT soundings typically include a surface layer of very soft sediments overlying soft Holocene-age marine clay deposits, referred to as Young Bay Mud.

Surface Sediment Layer. As encountered in many of the CPT soundings and defined by the offshore borings, the near surface sediments include a surface sediment layer at the mudline. The measured cone point resistance in these sediments typically was less than 0.1 MPa [1 ton per square foot (tsf)]. The occasional appearance of a large "spike" in the cone point resistance trace may be indicative of shells or shell fragments. On the basis of the measured tip resistance and friction ratio, we interpret that these sediments consist primarily of very soft clay. The surface sediment layer has similar cone tip resistances and friction ratios, and appears to correlate with the historical bay mud deposits encountered at the tidal mudflats to the north of the Oakland Mole. In that area, the data show that the historical bay mud has been deposited since the construction of the bridge in the 1930s (Fugro, 1999). The thickness of the surface sediment layer varies from more than 5 meters near the east main pier to less than 1 meter just north of the Oakland Mole. On the tidal mudflats to the north of the Oakland Mole a deposit of surface sand overlies the surface sediment layer.

Young Bay Mud. In all of the CPT soundings, the surface sediment layer is underlain by Young Bay Mud (YBM). The measured cone point resistance in the YBM sediments varies from 0.1 to 0.5 MPa [1 to 5 tons per square foot (tsf)]. On the basis of the measured tip resistance and friction ratio, we interpret that these sediments penetrated by the cone consist primarily of soft clay. The layer of YBM locally includes significant sand or silt layers, seams and pockets. The very thin silt or sand layers and seams are identified from an increase in cone tip resistance with an accompanied reduction in excess pore pressure. In several cases within the YBM the Seacout CPT soundings encountered thicker layers of dense sand. Plate 98-418 shows one of these layers, penetrated by the Seascout CPT, that have been identified as thin layers within the paleochannel infill clays (Fugro, 1998).

Standardization

CPTs provide correlation parameters such as cone resistance, rather than properties such as compressive strength. A high degree of standardization of CPTs is therefore important to allow the correlation and the interpretation of the results. The standardization includes the cone penetrometer geometry and the rate of penetration. Layering and soil structure also contributes to significant differences between various cone sizes.

Cone Size. An important standardization item of the cone penetrometer geometry is the area of the cone base. Conventionally, this area is 1,000 mm^2. The International Reference Test Procedure for Cone Penetration Test prepared by ISSMFE (1989) permits deviations from the Reference Test (1,000 mm^2) under the following conditions:

- Explicit description, including a note on the graphs with the test results
- Tolerances for the cone base area to be adapted in direct proportion to the diameter
- Surface area of the sleeve to be adjusted proportionally with respect to the cross-sectional area of the cone

Although the 100 mm^2 Seascout cone penetrometer is not a conventional cone size, it meets the above-stated requirements of ISSMFE.

Rate of Penetration. The conventional rate of penetration for standard-sized CPTs is 20 ±5 millimeters per second (mm/s). The Seascout rate of penetration is approximately 40 mm/s. The selected higher penetration rate represents an estimated adjustment for cone penetrometer size. This adjustment relates to permeability (in particular, the transition zone between drained and undrained ground behavior during cone penetration). The higher penetration rate possibly affects the tip resistance, sleeve friction, and pore pressure measurements, but with a limit of a few percent.

Significance of Layering and Soil Structure. Geotechnically, the results of a smaller cone penetrometer may differ from the 1,000-mm^2 cone penetrometer. Recognized factors that may contribute to differences include:

- Particle size of soil
- Soil layering
- Soil structure
- Density of loose granular sediments

The signature of a cone penetrometer may be affected where the d_{50} of a soil exceeds the equivalent of about six times the diameter of the cone penetrometer.

The loading response of a smaller cone penetrometer to soil layering is more rapid than that of a larger penetrometer. This relates to soil failure mechanisms in layered soils. In layered soils, the smaller cone penetrometer may show both higher peak and lower base q_c values. In addition, the smaller cone is more sensitive to the presence of thin layers, whose resistance is averaged beneath a larger standard cone.

Soil structure may cause failure mechanisms to occur along zones of weakness. The larger penetrometer affects a larger mass of soil and thus a greater potential for soil structure effects. Therefore, the larger cone penetrometer may exhibit a lower cone resistance in structured soils.

Recent investigations of newly-placed granular hydraulic fill (Fugro, 1998) have shown that the cone resistances measured with the miniature cone are different than those measured with a standard-sized cone in loose to medium dense granular soils. The data show that the magnitude of those differences increases as the void ratio of the sediment increases.

Data Interpretation

Because of the factors discussed above, caution should be taken when interpreting the small-diameter Seascout CPT data. The Seascout uses a 100-mm^2 (0.15-square-inch [in.^{2}]) cone as compared to the 1,000-mm^2 (1.55-in.^{2}) "standard" cone. Cone type, cone size, scale, and rate effects can affect the measured tip and friction sleeve resistances and generated pore pressures. Plate 3 shows the difference in size and rate of penetration between the types of piezocones discussed.

Thus, the sounding results should be used as a qualitative indicator of subsurface conditions and quantitative empirical relationships should be used with caution. Only those individuals experienced with the miniature cone should make the interpretation of soil parameters from the data.

Comparison of Tethered Seascout CPTs with Downhole Dolphin Cone

Several Seascout CPT soundings were performed close to offshore borings that include downhole Dolphin CPT tests. As the downhole Dolphin CPT system requires the bottomhole thruster drag bit assembly be advanced prior to testing, Dolphin CPTs are only possible below about 4 meters penetration (Fugro, 1998). In some cases however, Dolphin CPTs were performed from the deck only a few meters below the mudline and allow a comparison with the Seascout CPT soundings.

Plate 4 shows several examples of Seascout CPT sounding traces superimposed onto downhole Dolphin CPTs (represented by bold lines) performed in the adjacent offshore marine borings. Considering the difference in sizes of the cones and the significance of the soil structure and layering discussed previously, there is good correlation of the data between the two sizes of cones. The N_k values used to determine the undrained shear strength of the cohesive soils from the cone tip resistance (q_c) may not be used interchangeably for each cone. From our experience with both systems and by comparing with available undrained shear strength determination from laboratory testing, N_k values of about 10 to 12 is appropriate for the downhole Dolphin cone, whereas a N_k values of about 12 to 15 is appropriate for the Seascout CPT.

Limitations

In performing the exploration and professional services described within this report, we have used that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers currently practicing in this or similar localities. No other warranty, expressed or implied, is made relative to the professional opinions included in this report.

* * * * *

The following illustrations are attached and complete this report:

	Plate
Location Map	1
Photographs of Tethered Seascout Retrieval	2
Comparison between Land, Dolphin, and Seascout CPTs	3
Comparison of Seascout and Dolphin CPTs	4
Logs of CPTs, Soundings 98-401 through 98-454	98-401 to 454
Logs of CPTs, Soundings 98-501, 98-505 and 506	98-501, 505, and 506

We appreciate this opportunity to provide our services on this unique and interesting project, and look forward to our continued association with the joint venture of Fugro-Earth Mechanics. Please contact us if you have any questions or require additional information.

Sincerely,

FUGRO WEST, INC.

Philip Robins
Staff Engineer

M. Jacob Chacko, P.E.
Project Engineer

PNR:av

Attachments: References
Plates 1 through 4
Plates 98-401 through 98-454
Plates 98-501, 98-505 and 98-506

REFERENCES

Fugro-Earth Mechanics (1998a), *Preliminary Foundation Design Report San Francisco-Oakland Bay Bridge East Span Seismic Safety Project*, FWI Job No. 98-42-0053, prepared for the California Department of Transportation, August.

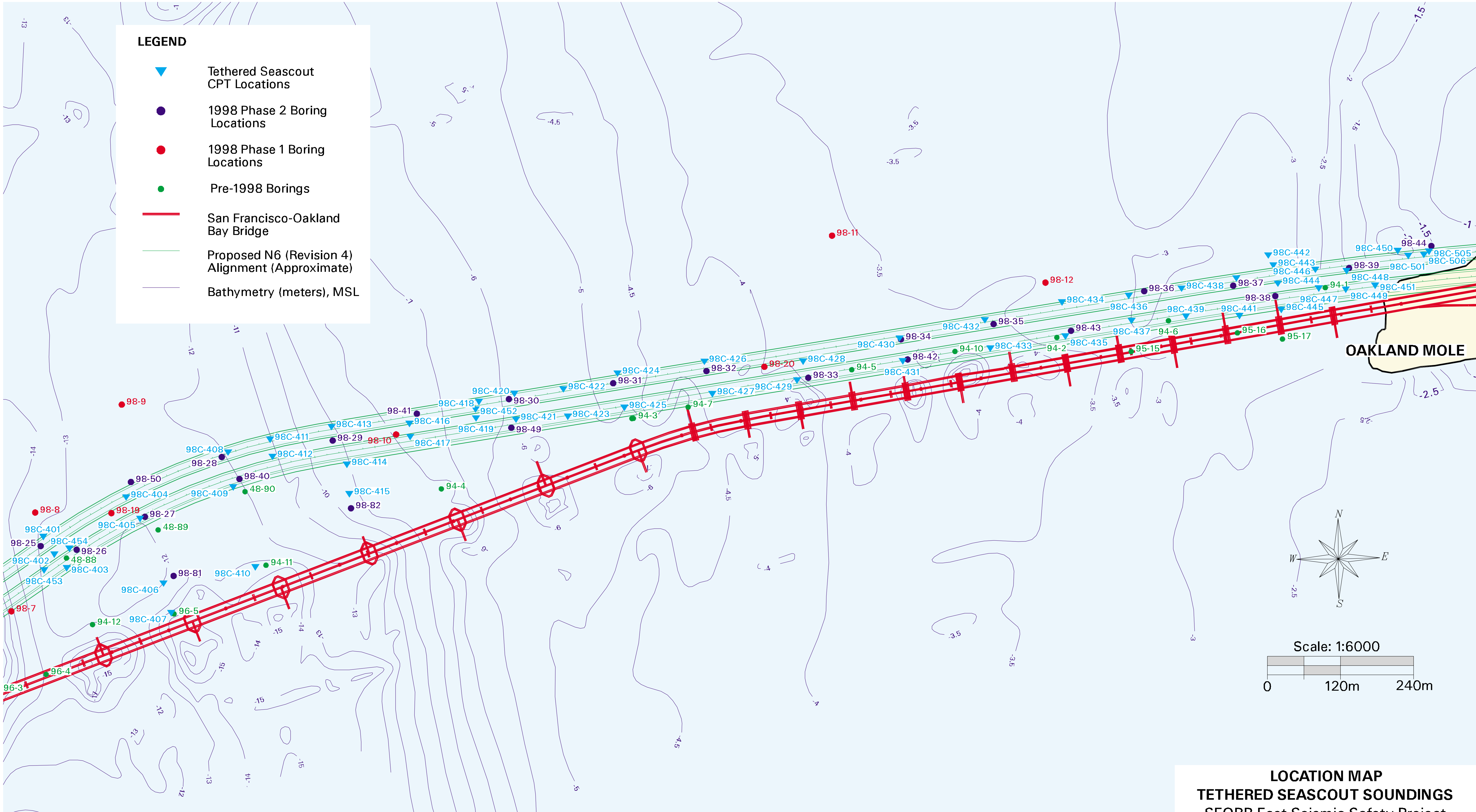
______ (1998b), *Preliminary Marine geotechnical Site Characterization San Francisco-Oakland Bay Bridge East Span Seismic Safety Project*, FWI Job No. 98-42-0035, prepared for the California Department of Transportation, June.

______ (1999), *Draft Final Oakland Shore Approach Geotechnical Site Characterization Report San Francisco-Oakland Bay Bridge East Span Seismic Safety Project*, FWI Job No. 98-42-0058, prepared for the California Department of Transportation, March.

Fugro West, Inc. (1998), *In Situ "Tethered" Cone Penetration Test Results, Port of Los Angeles-Pier 400 Stage 2 Dredging & Landfill Project*, FWI Job No. 96-42-1204, prepared for the Los Angeles Harbor Department, August.

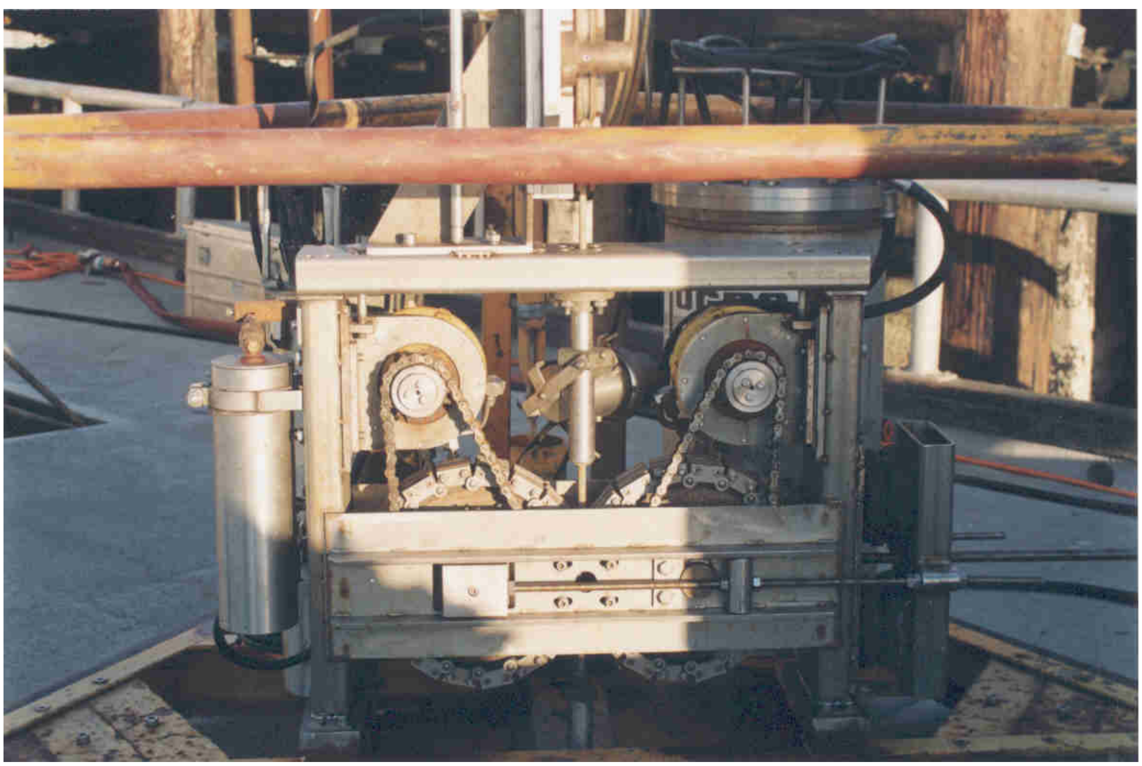
ISSMFE (1989), "Report on the ISSMFE Technical Committee on Penetration Testing of Soils - TC16 With Reference Test Procedures CPT - SPT - DP - WST", Appendix A, International Reference Test Procedure for Cone Penetration Test (CPT), pp. 6 - 23.

FUGRO



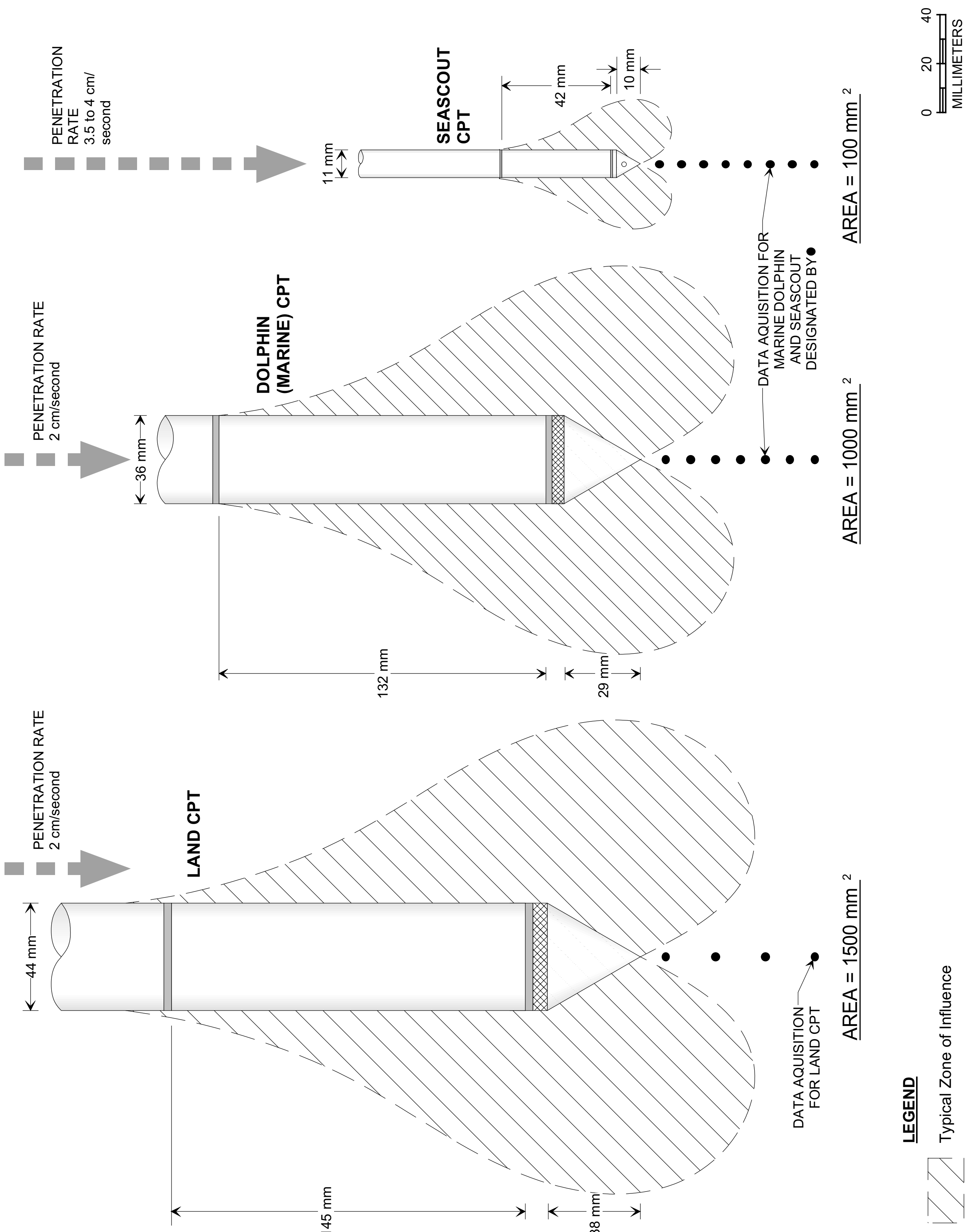
LOCATION MAP
TETHERED SEASCOUT SOUNDINGS
SFOBB East Seismic Safety Project

PLATE 1



TETHERED SEASCOUT RETRIEVAL
Marine Geotechnical Site Characterization
SFOBB East Span Seismic Safety Project

PLATE 2



COMPARISON BETWEEN LAND, DOLPHIN AND SEASCOUT CPTS
Marine Geotechnical Site Characterization
SFOBB East Span Seismic Safety Project

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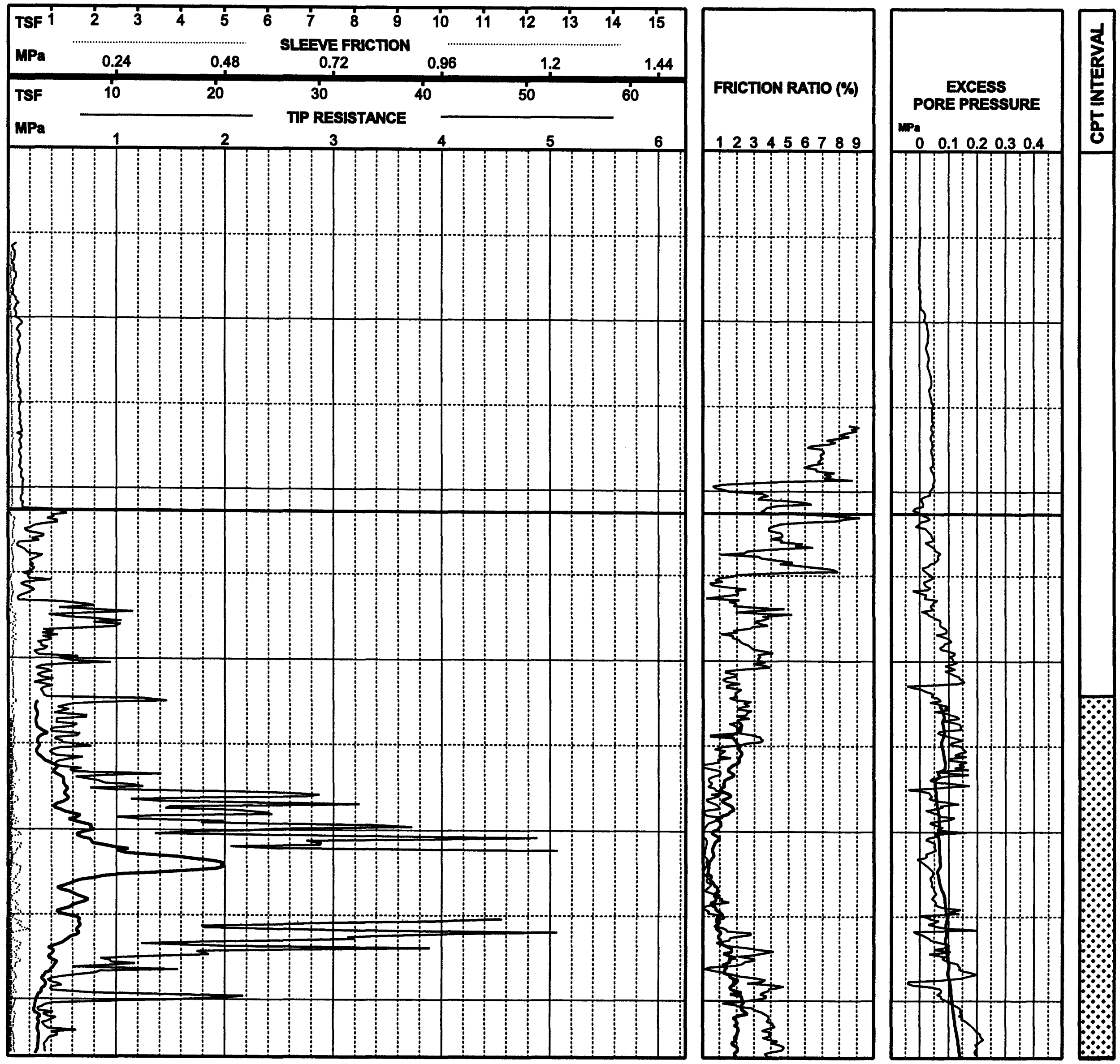
PROJECT NO: 98-42-0054	**START DATE:** 09/06/98	**DRILLER:** Fugro-McClelland Marine Geosciences
BORING/SOUNDING: 98-30/98-418	**VESSEL:** MV White Lightning	**DRILLING METHOD:** Rotary Sample Boring (Wet)

Coordinates: E1837434 N648060
CA State Plane Zone 3, NAD83, Meters

ELEVATION, m.	DEPTH, m.	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
			MUDLINE ELEVATION: -5.6m (MSL)	
-6		WOH	Fat CLAY (CH), very soft, olive gray -with root fibers, at 0.6m	I
-7	1	WOH	-with a few silt pockets and light brown streaks, at 1.2m	
			-with many shells and shell fragments, below 1.5m	
	2	WOH	(2.1m)	
-8			Fat CLAY (CH), soft, olive gray -with silt pockets and partings, at 2.1m	II
			-with many large sand pockets and sand partings, below 2.7m	
-9	3	WOH		
-10	4	15/60cm	-loose sand layer, 4.1m to 4.3m -clay with fine sand, 4.3m to 5.0m	
	5	9/60cm		



NOTE: Bold line represents downhole Dolphin CPT

COMPARISON OF SEASCOUT AND DOLPHIN CPTS

BORING 98-30 and TETHERED SEASCOUT SOUNDING 98-418

SFOBB East Span Seismic Safety Project

FUGRO

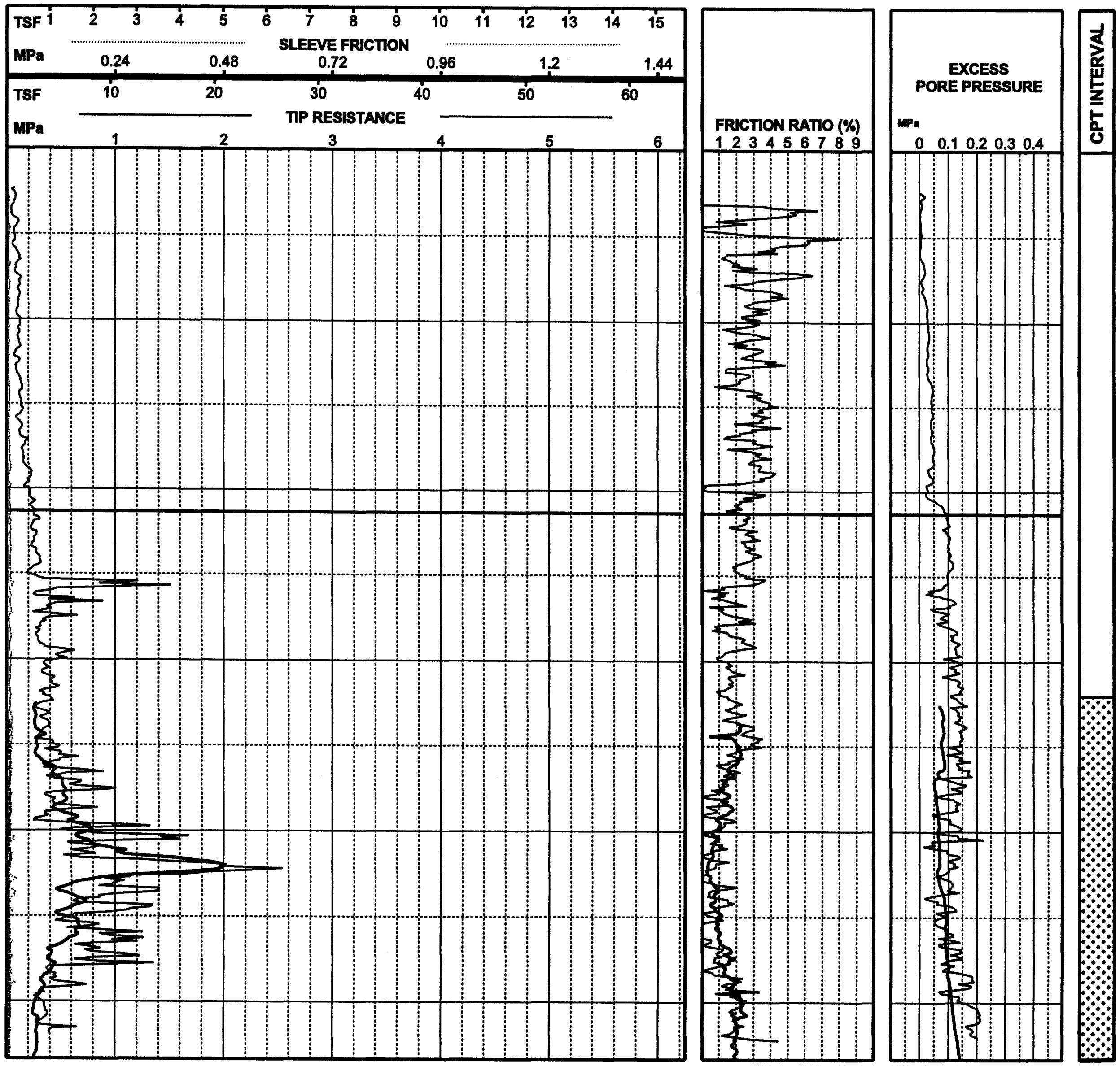
Report Date: 05/13/99

PLATE 4a

PROJECT NO:	98-42-0054	**START DATE:**	09/06/98	**DRILLER:**	Fugro-McClelland Marine Geosciences
BORING/SOUNDING:	98-30/98-420	**VESSEL:**	MV White Lightning	**DRILLING METHOD:**	Rotary Sample Boring (Wet)

Coordinates: E1837434 N648060
CA State Plane Zone 3, NAD83, Meters

ELEVATION, m.	DEPTH, m.	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
			MUDLINE ELEVATION: -5.6m (MSL)	
-6		WOH	Fat CLAY (CH), very soft, olive gray -with root fibers, at 0.6m	I
-7	1	WOH	-with a few silt pockets and light brown streaks, at 1.2m	
	2		-with many shells and shell fragments, below 1.5m (2.1m)	
-8		WOH	Fat CLAY (CH), soft, olive gray -with silt pockets and partings, at 2.1m	II
			-with many large sand pockets and sand partings, below 2.7m	
-9	3	WOH		
-10	4	15/60cm	-loose sand layer, 4.1m to 4.3m -clay with fine sand, 4.3m to 5.0m	
	5	9/60cm		



NOTE: Bold line represents downhole Dolphin CPT

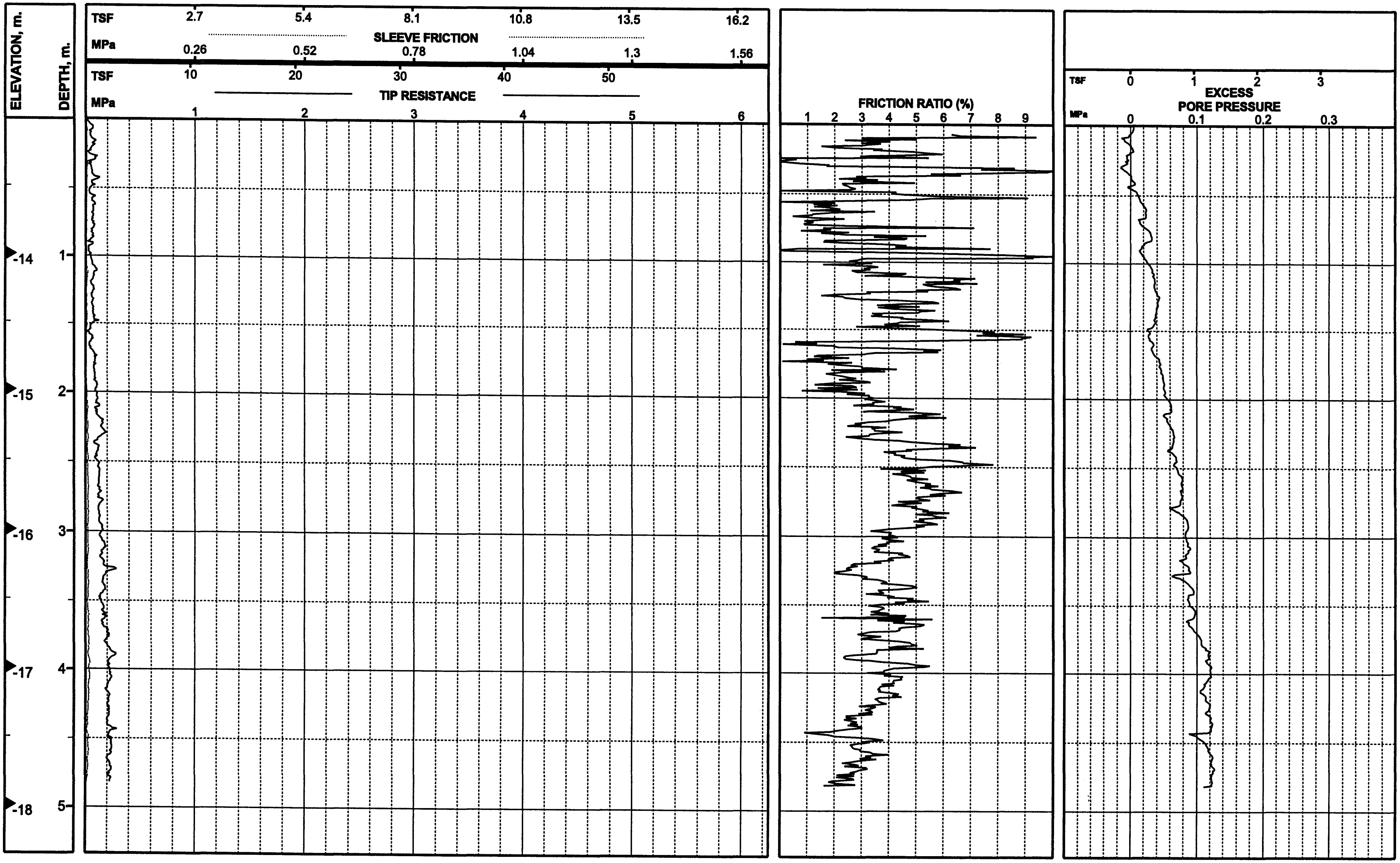
COMPARISON OF SEASCOUT AND DOLPHIN CPTS

BORING 98-30 and TETHERED SEASCOUT SOUNDING 98-420

SFOBB East Span Seismic Safety Project

Report Date: 05/13/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1836670 N647834 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-401 (Main Span Area)	**MUDLINE ELEVATION:**	-13.0 m (MSL)	**TEST DATE:**	12/18/98



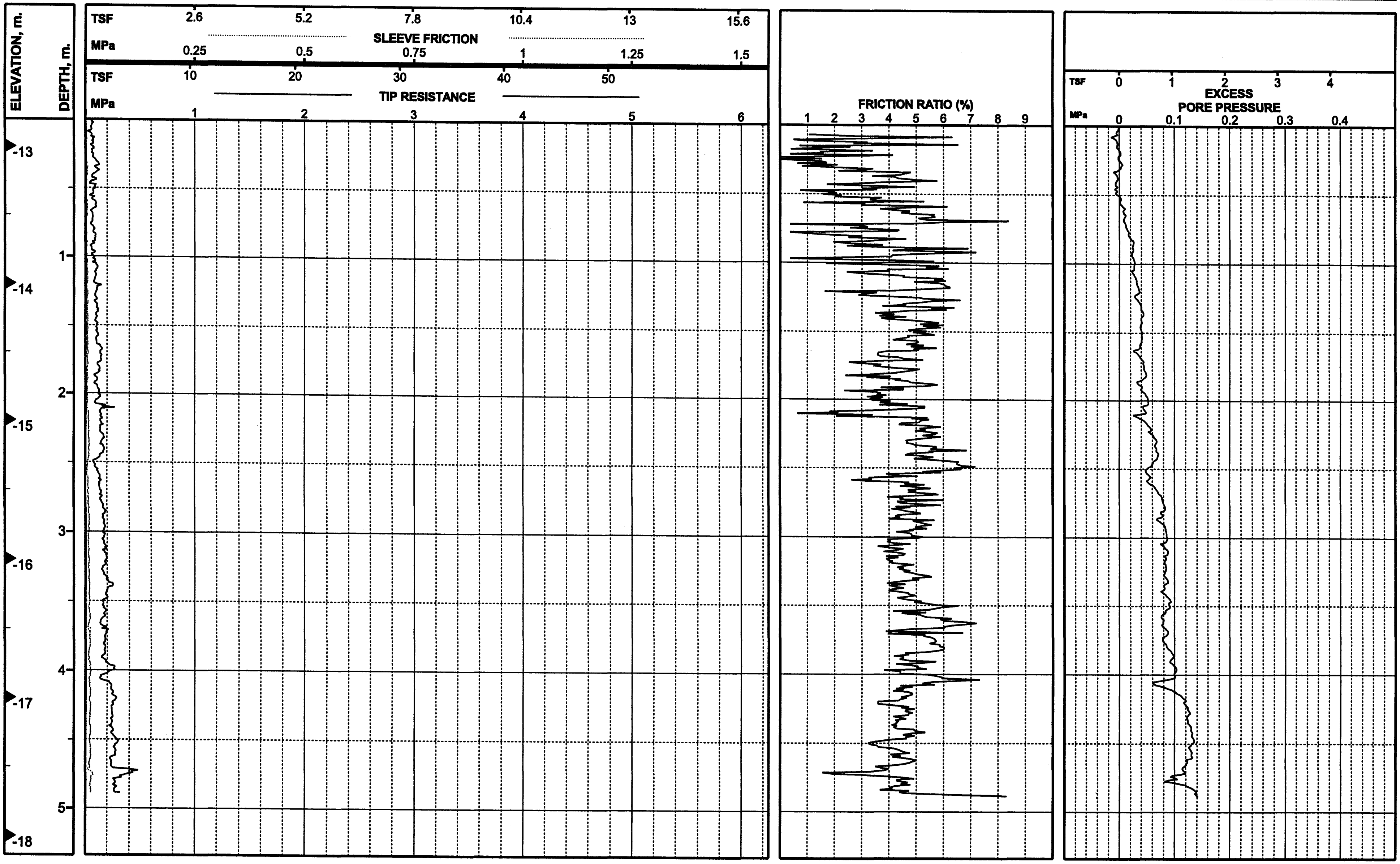
NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-401
SFOBB East Span Seismic Safety Project

Report Date: 05/14/99

FUGRO

PROJECT NO:	98-42-0054	COORDINATES:	E1836688 N647805 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-402 (Main Span Area)	MUDLINE ELEVATION:	-12.8 m (MSL)	TEST DATE:	12/18/98



NOTE: SeaScout CPT uses 1 sq. cm cone

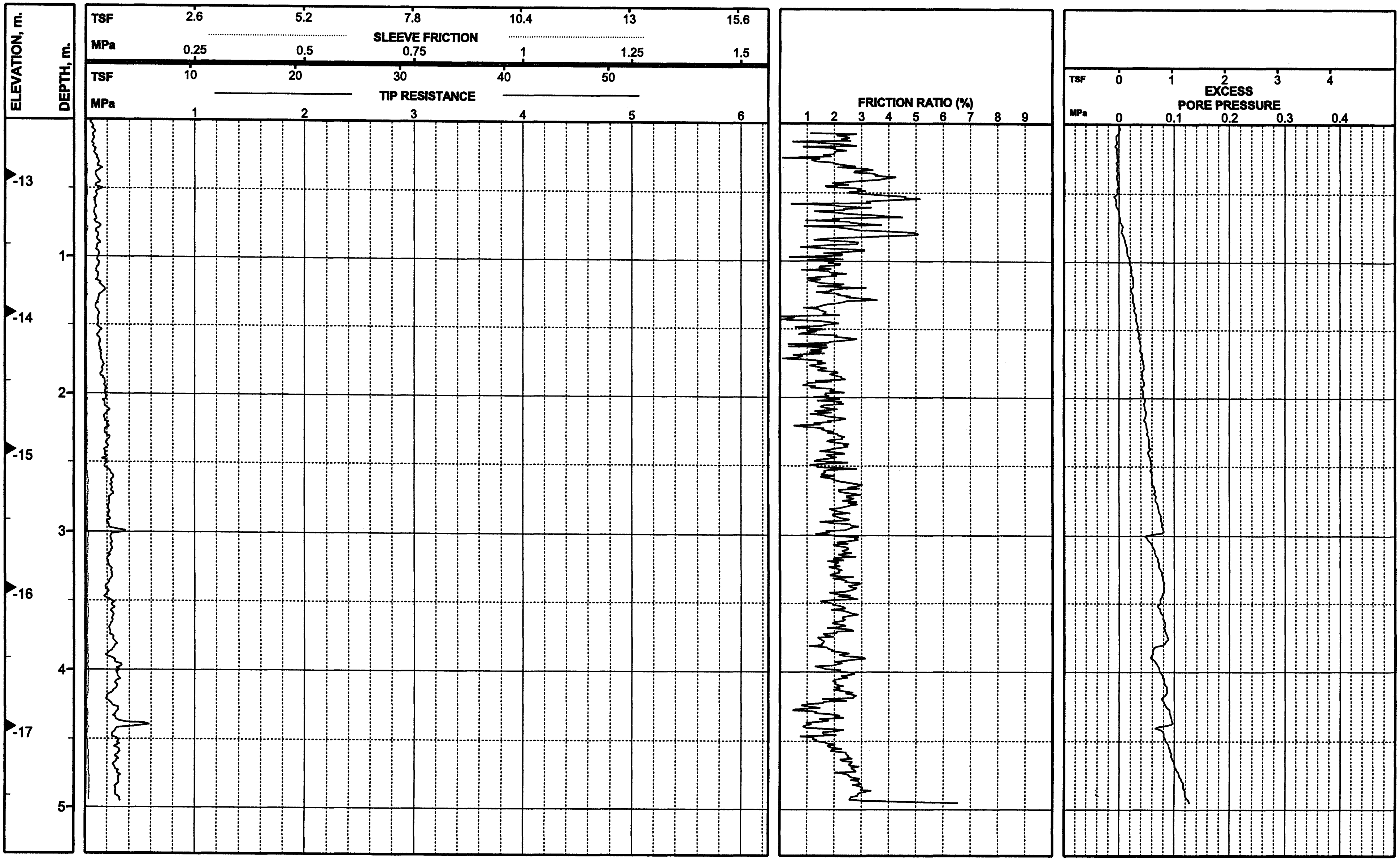
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-402

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO: 98-42-0054	**COORDINATES:** E1836709 N647783 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning
EXPLORATION NO.: 98C-403 (Main Span Area)	**MUDLINE ELEVATION:** -12.6 m (MSL)	**TEST DATE:** 12/17/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

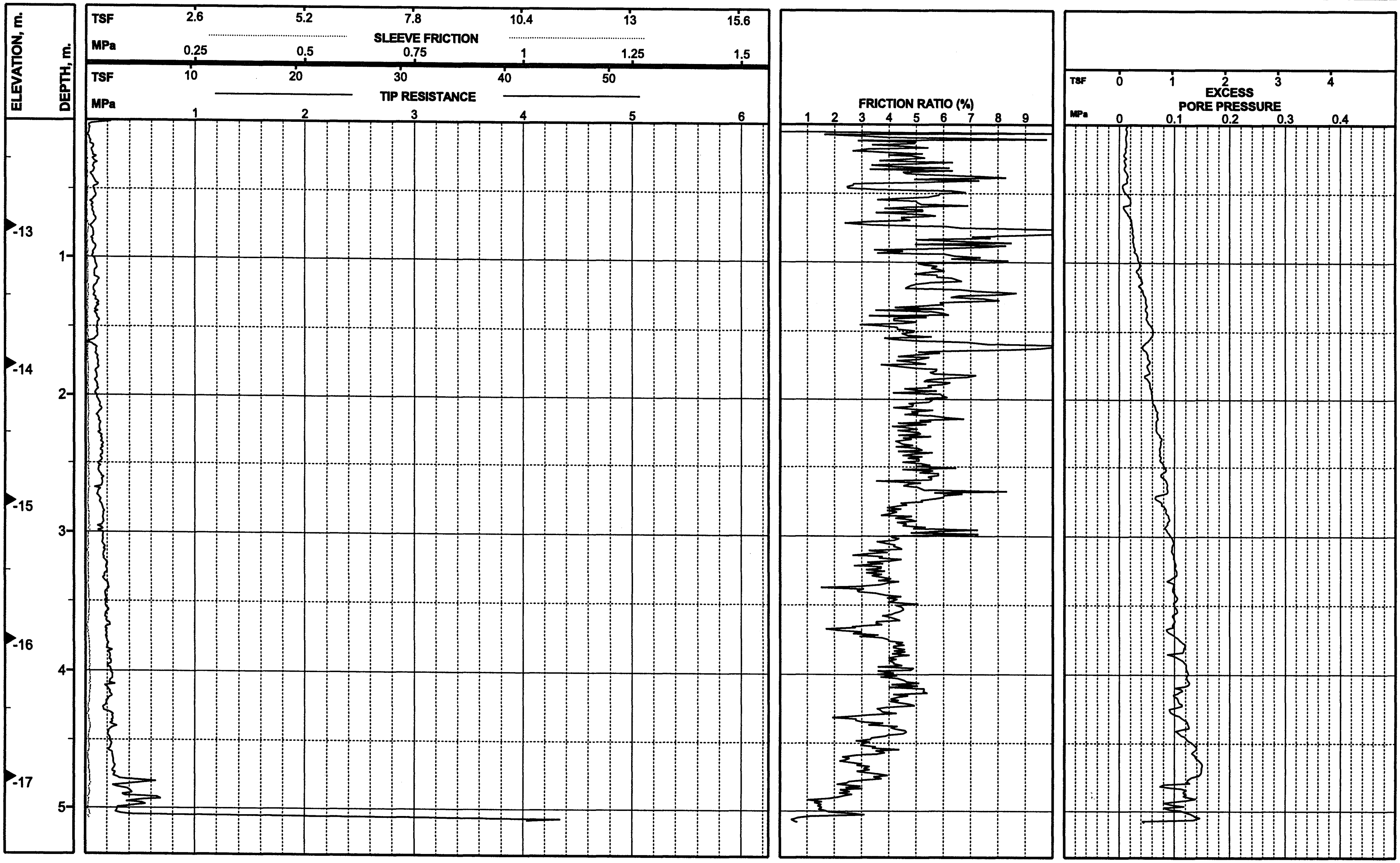
TETHERED SEASCOUT SOUNDING 98C-403

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PLATE 98-403

PROJECT NO:	98-42-0054	**COORDINATES:**	E1836806 N647899 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-404 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-12.2 m (MSL)	**TEST DATE:**	12/16/98

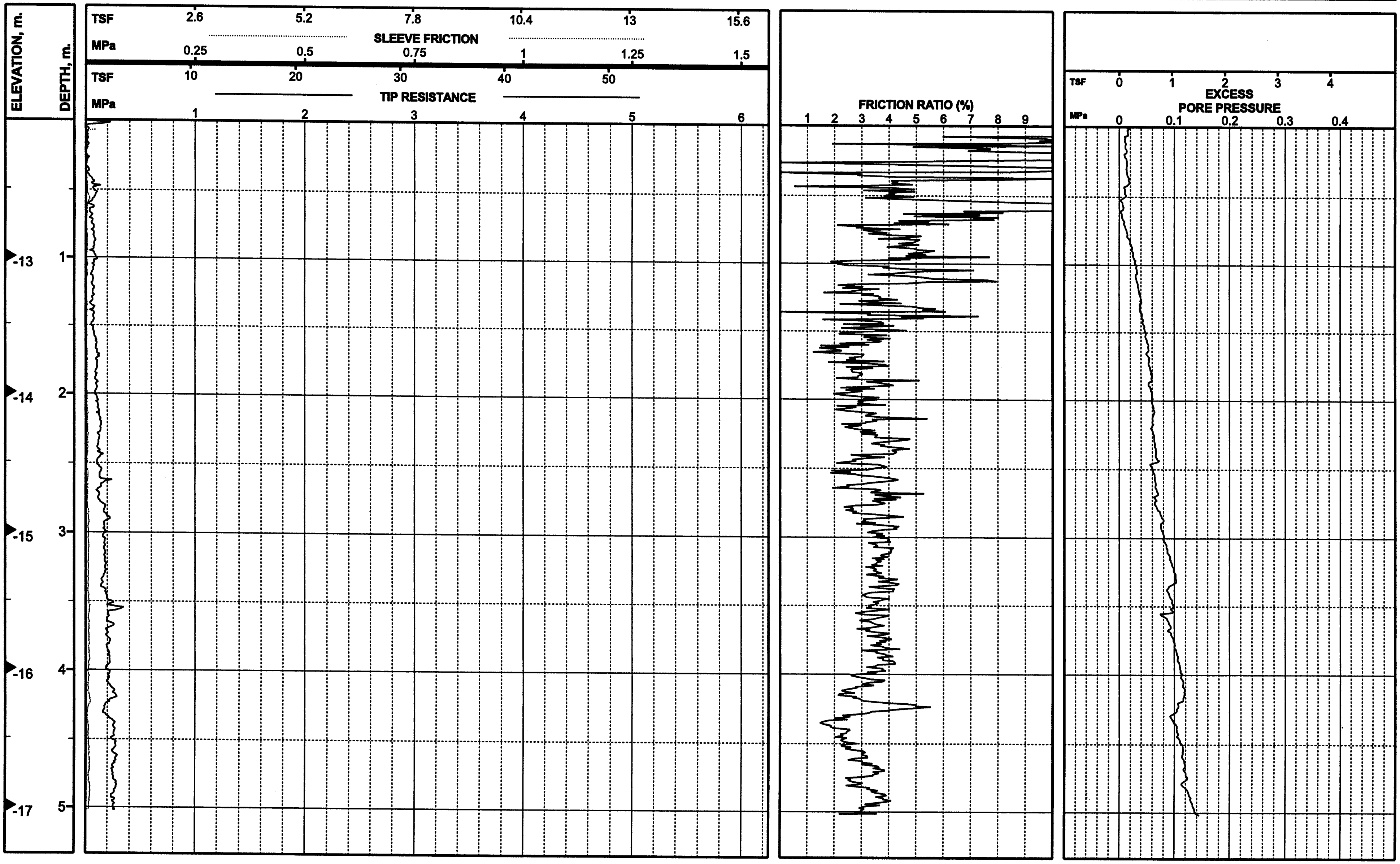


NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-404
SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	**COORDINATES:**	E647863 N1836829 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-405 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-12.0 m (MSL)	**TEST DATE:**	12/17/98



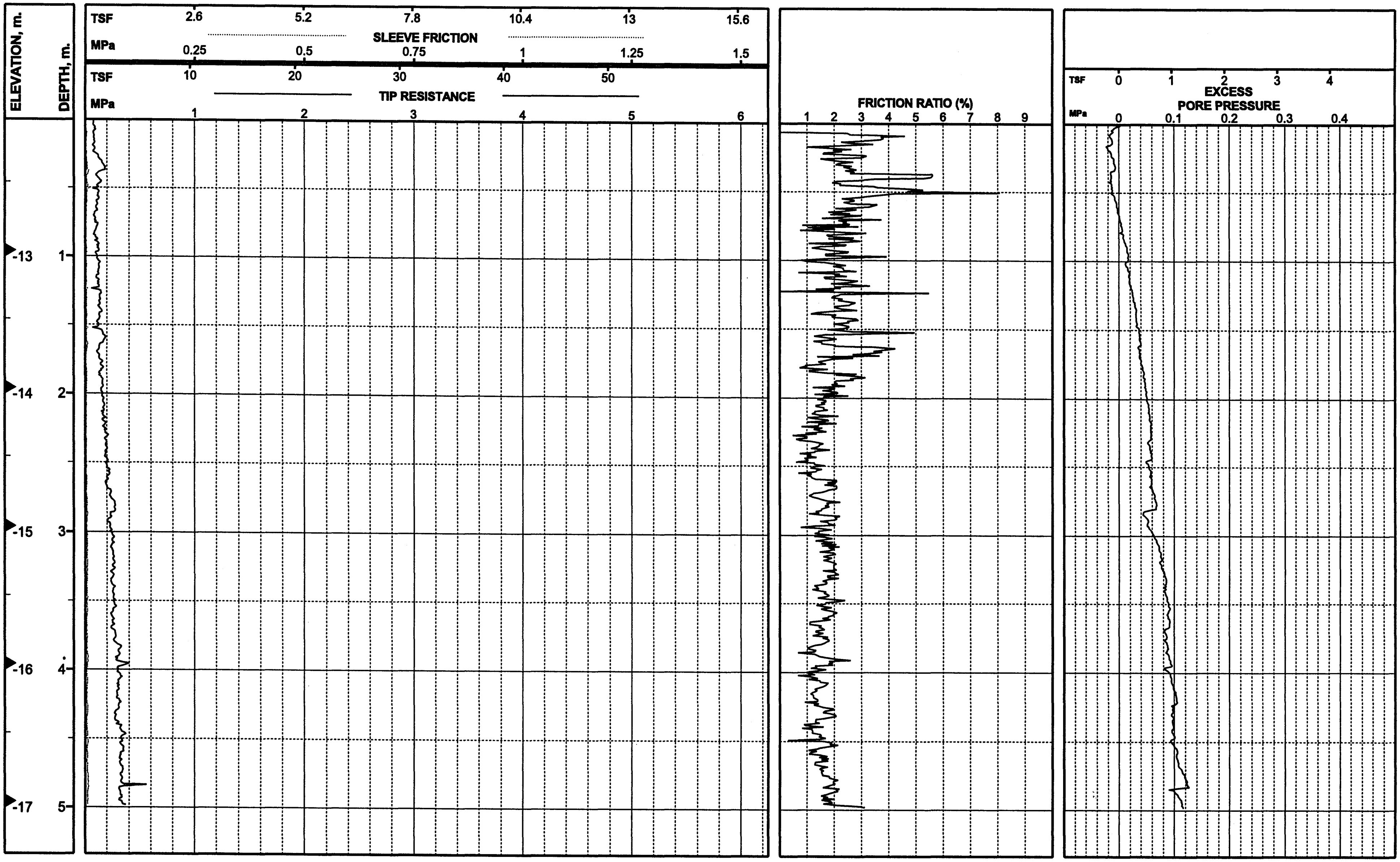
NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-405
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PLATE 98-405

PROJECT NO:	98-42-0054	**COORDINATES:**	E1836867 N647757 (CA State Plane Zone 3, NAD83, Meters)
EXPLORATION NO.:	98C-406 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-12.0 m (MSL)
VESSEL:	MV White Lightning	**TEST DATE:**	12/17/98



NOTE: SeaScout CPT uses 1 sq. cm cone

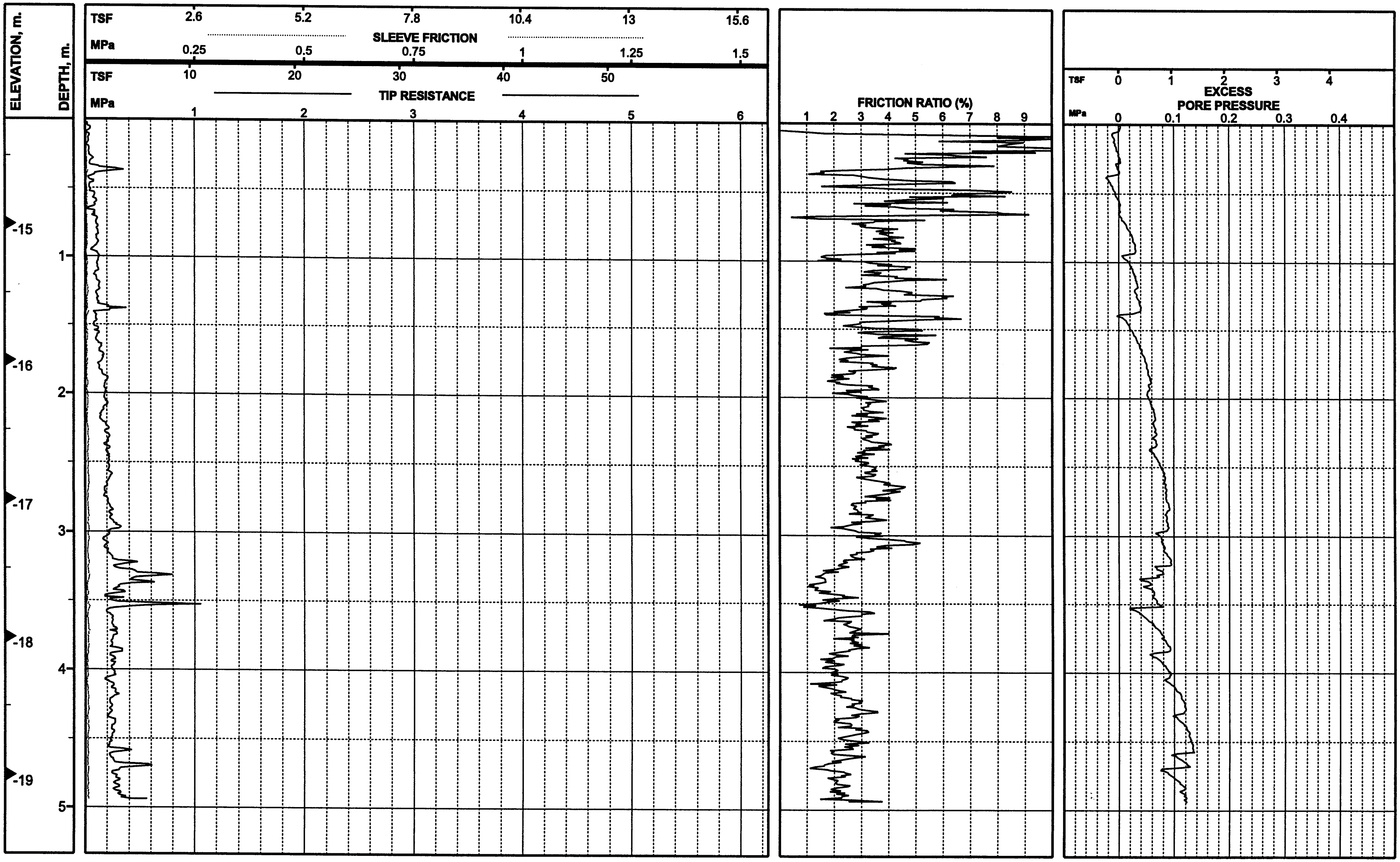
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-406

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1836880 N647709 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-407 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-14.2 m (MSL)	**TEST DATE:**	12/17/98



NOTE: SeaScout CPT uses 1 sq. cm cone

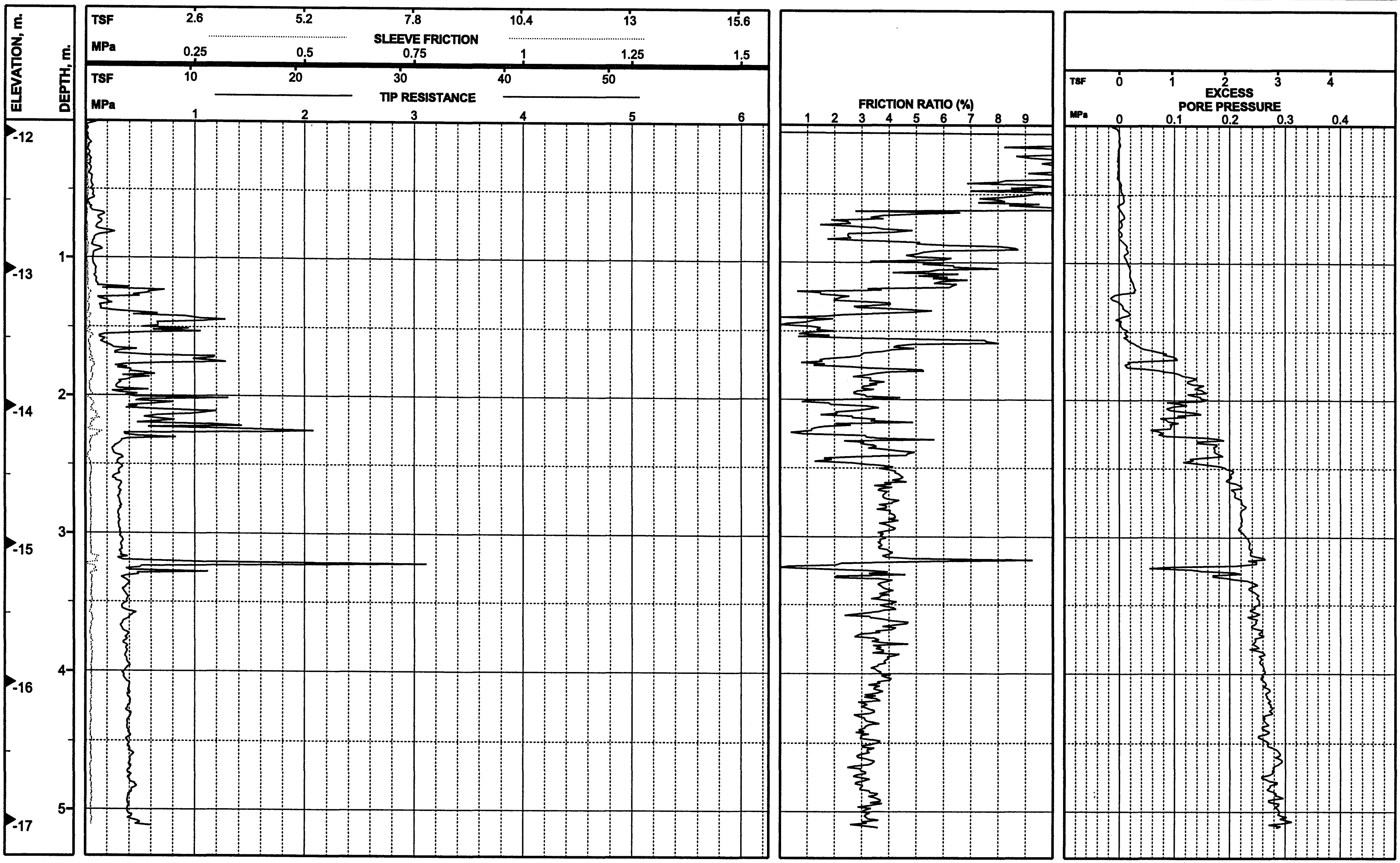
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-407

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1836973 N647972 (CA State Plane Zone 3, NAD83, Meters)
EXPLORATION NO.:	98C-408 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-11.9 m (MSL)
VESSEL:	MV White Lightning	**TEST DATE:**	12/16/98



NOTE: SeaScout CPT uses 1 sq. cm cone

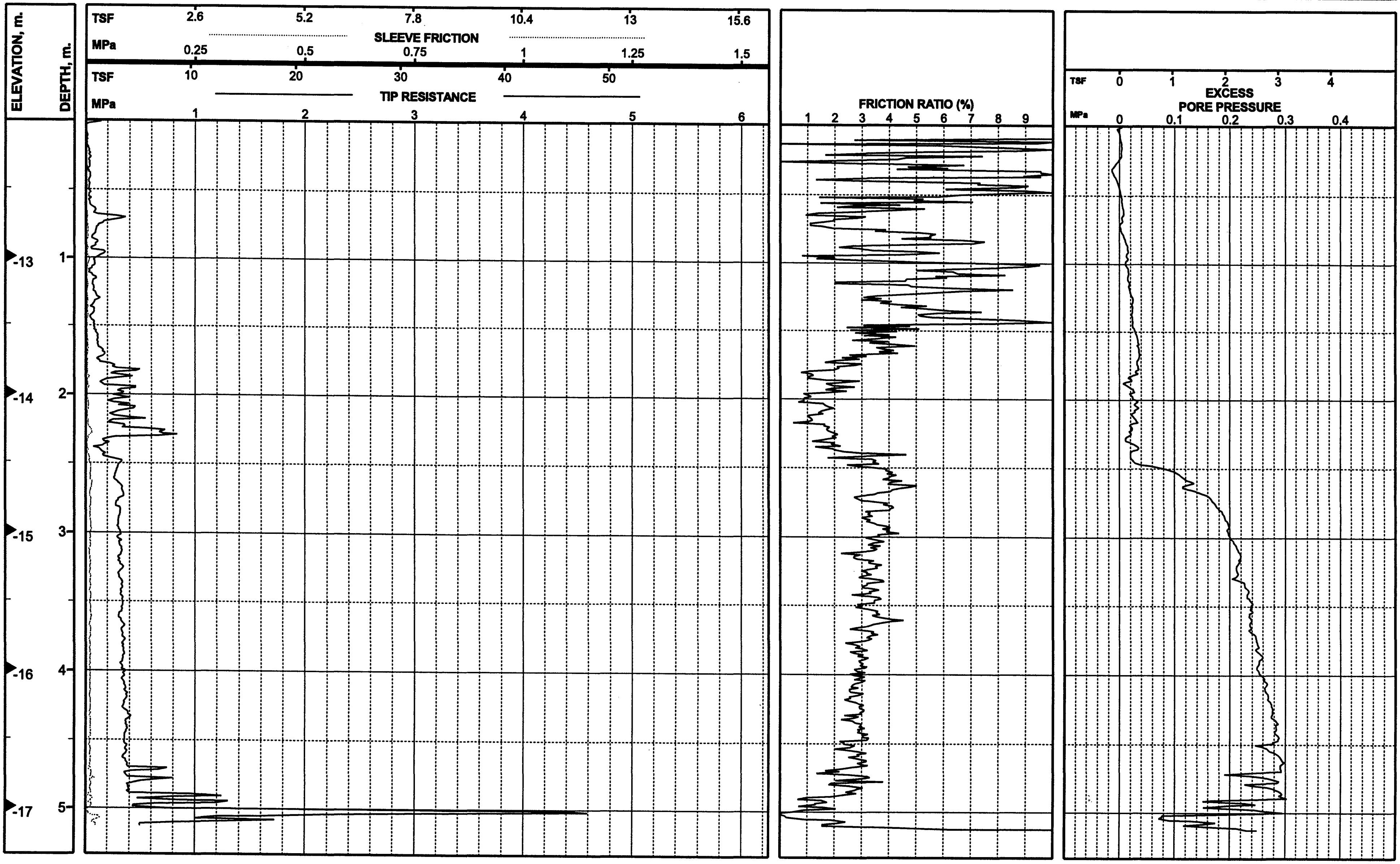
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-408

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1836982 N647915 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-409 (Skyway Frame 1)	MUDLINE ELEVATION:	-12.0 m (MSL)	TEST DATE:	12/16/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

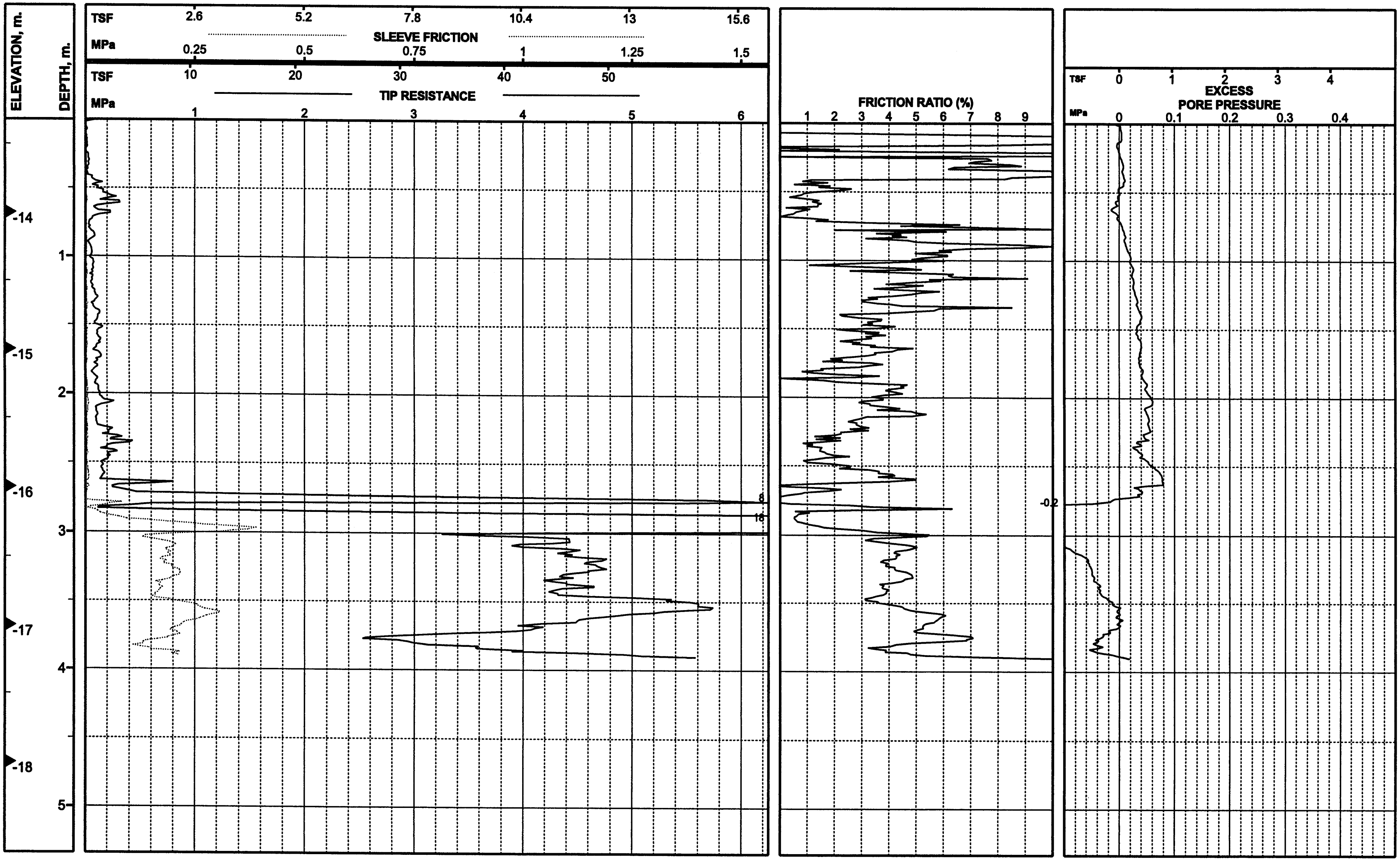
TETHERED SEASCOUT SOUNDING 98C-409

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PLATE 98-409

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837018 N647784 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-410 (Skyway Frame 3)	**MUDLINE ELEVATION:**	-13.3 m (MSL)	**TEST DATE:**	12/16/98



NOTE: SeaScout CPT uses 1 sq. cm cone

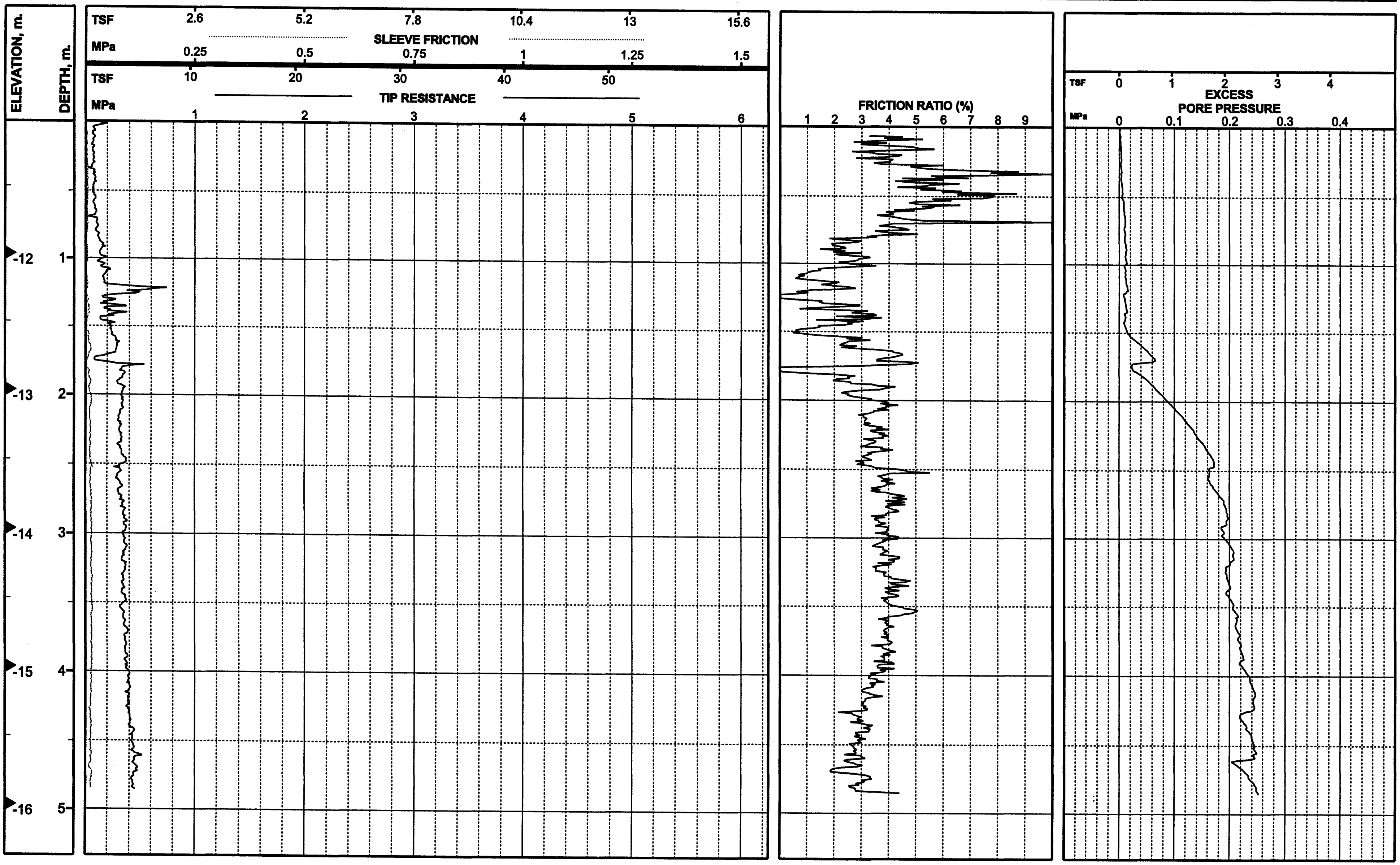
LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-410
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

FUGRO

PLATE 98-410

PROJECT NO:	98-42-0054	COORDINATES:	E1837042 N647993 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-411 (Skyway Frame 1)	MUDLINE ELEVATION:	-11.0 m (MSL)	TEST DATE:	12/19/98

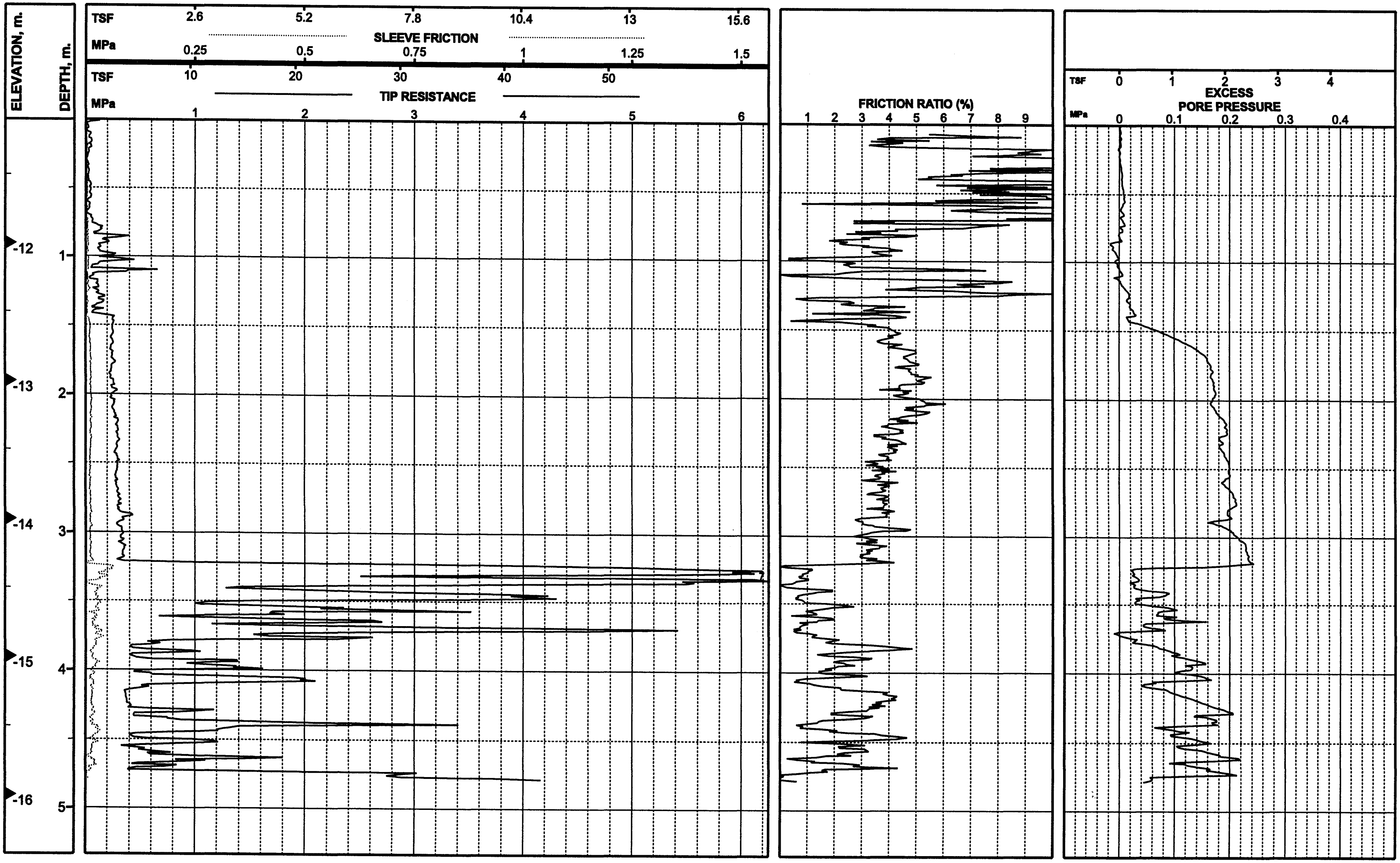


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-411
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837046 N647965 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-412 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-11.1 m (MSL)	**TEST DATE:**	12/19/98

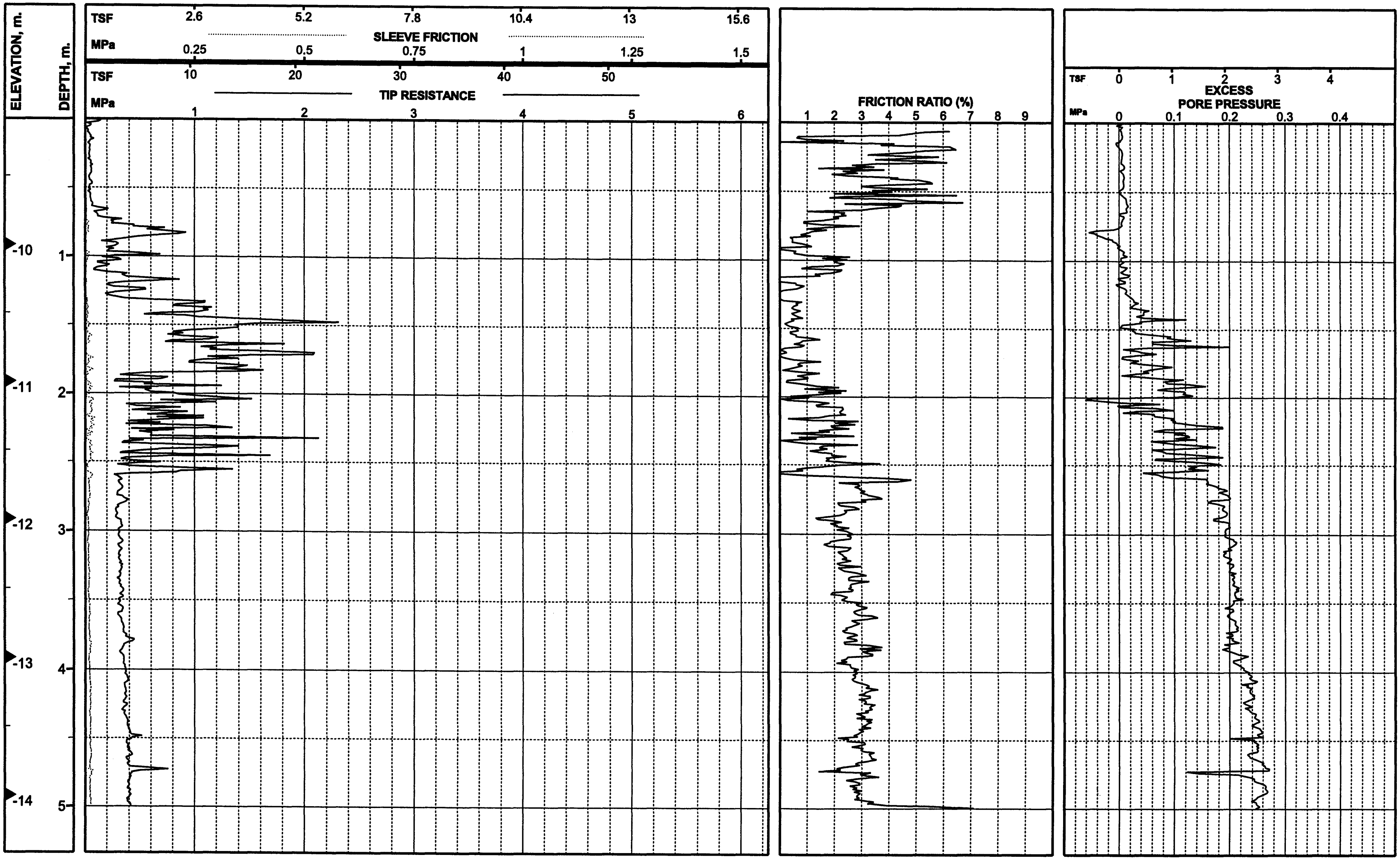


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-412
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837143 N648014 (CA State Plane Zone 3, NAD83, Meters)
EXPLORATION NO.:	98C-413 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-9.1 m (MSL)
VESSEL:	MV White Lightning	**TEST DATE:**	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

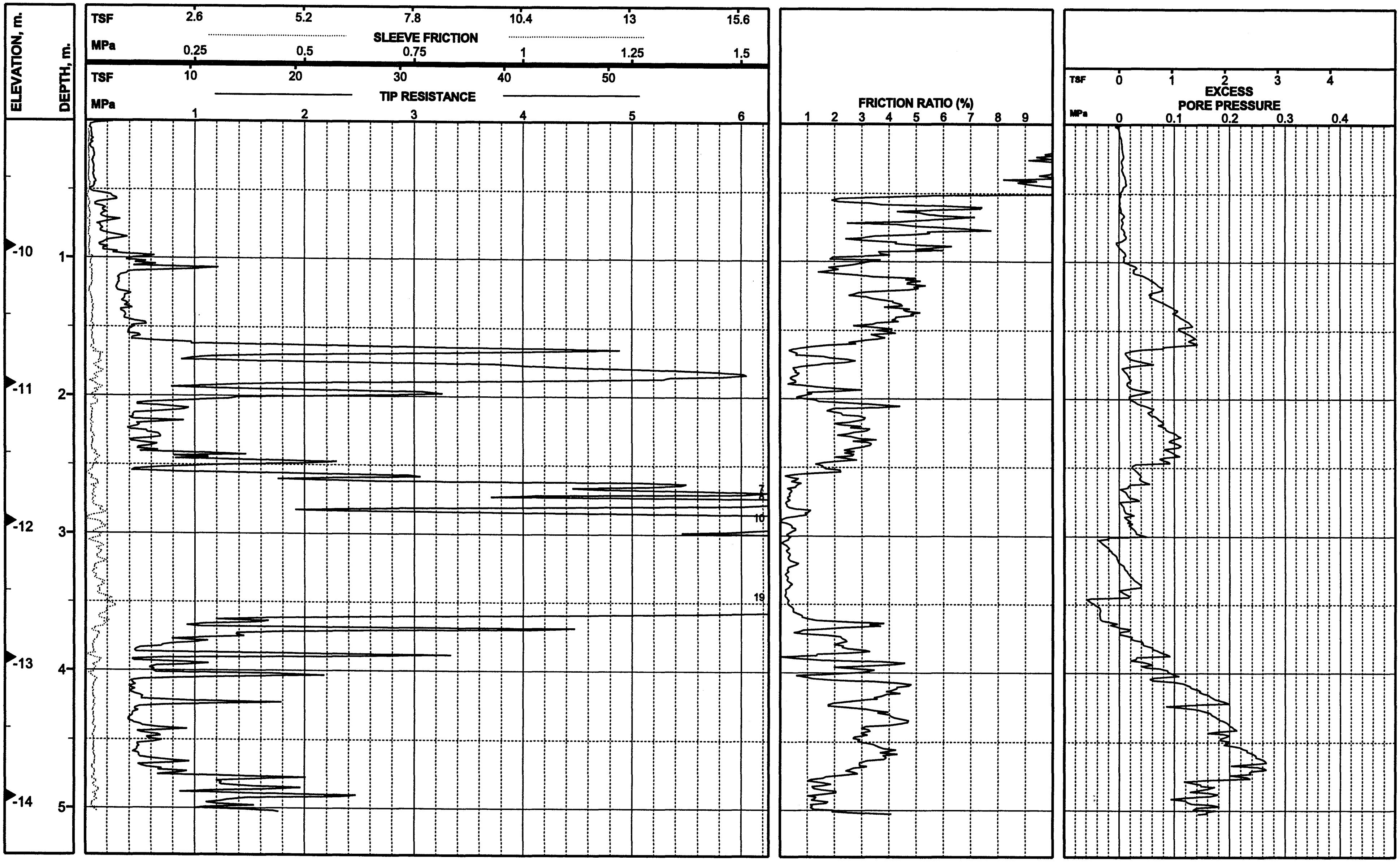
Report Date: 05/11/99

LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-413

SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837168 N647952 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-414 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-9.1 m (MSL)	**TEST DATE:**	12/16/98

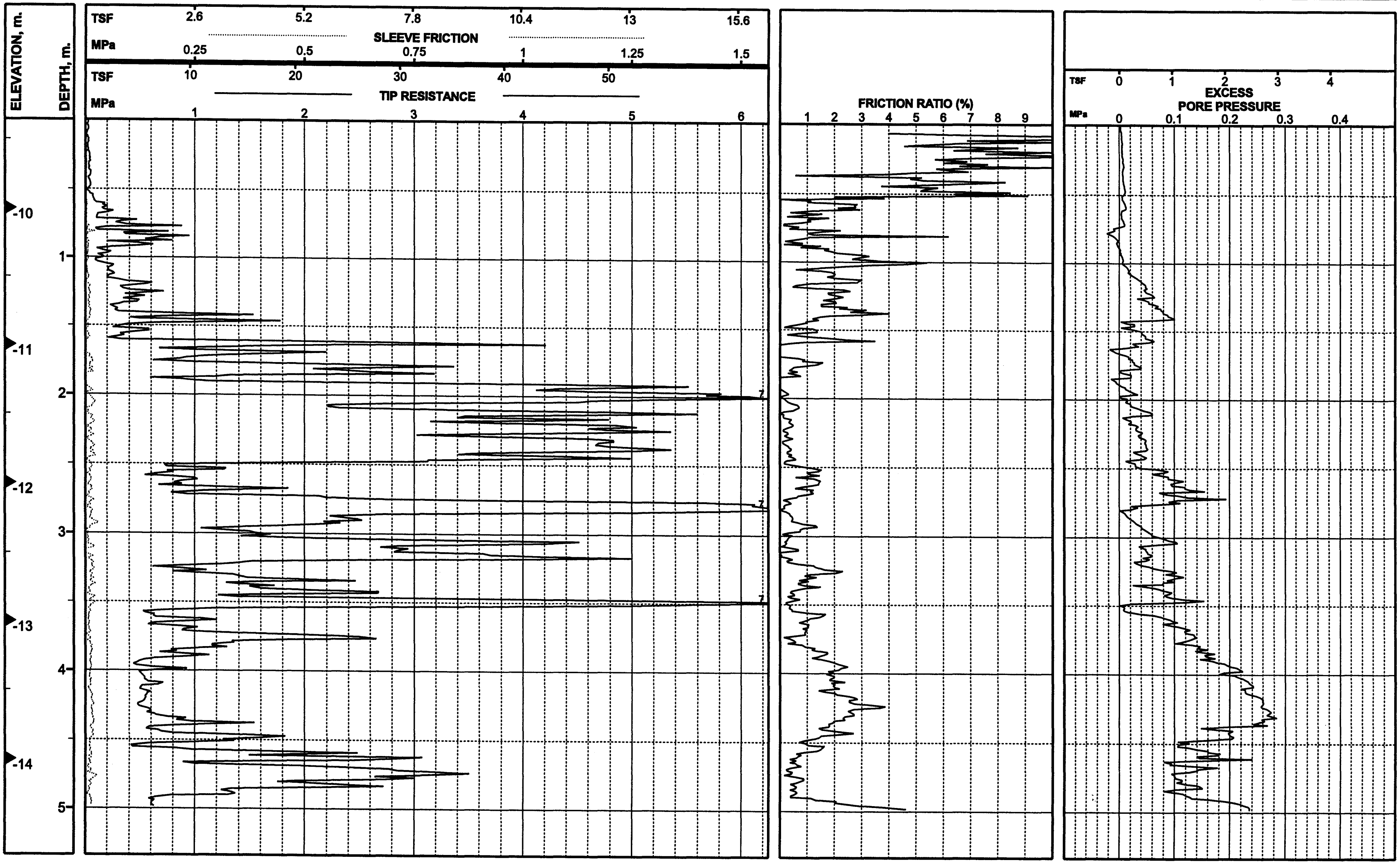


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-414
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837172 N647904 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-415 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-9.4 m (MSL)	**TEST DATE:**	12/16/98



NOTE: SeaScout CPT uses 1 sq. cm cone

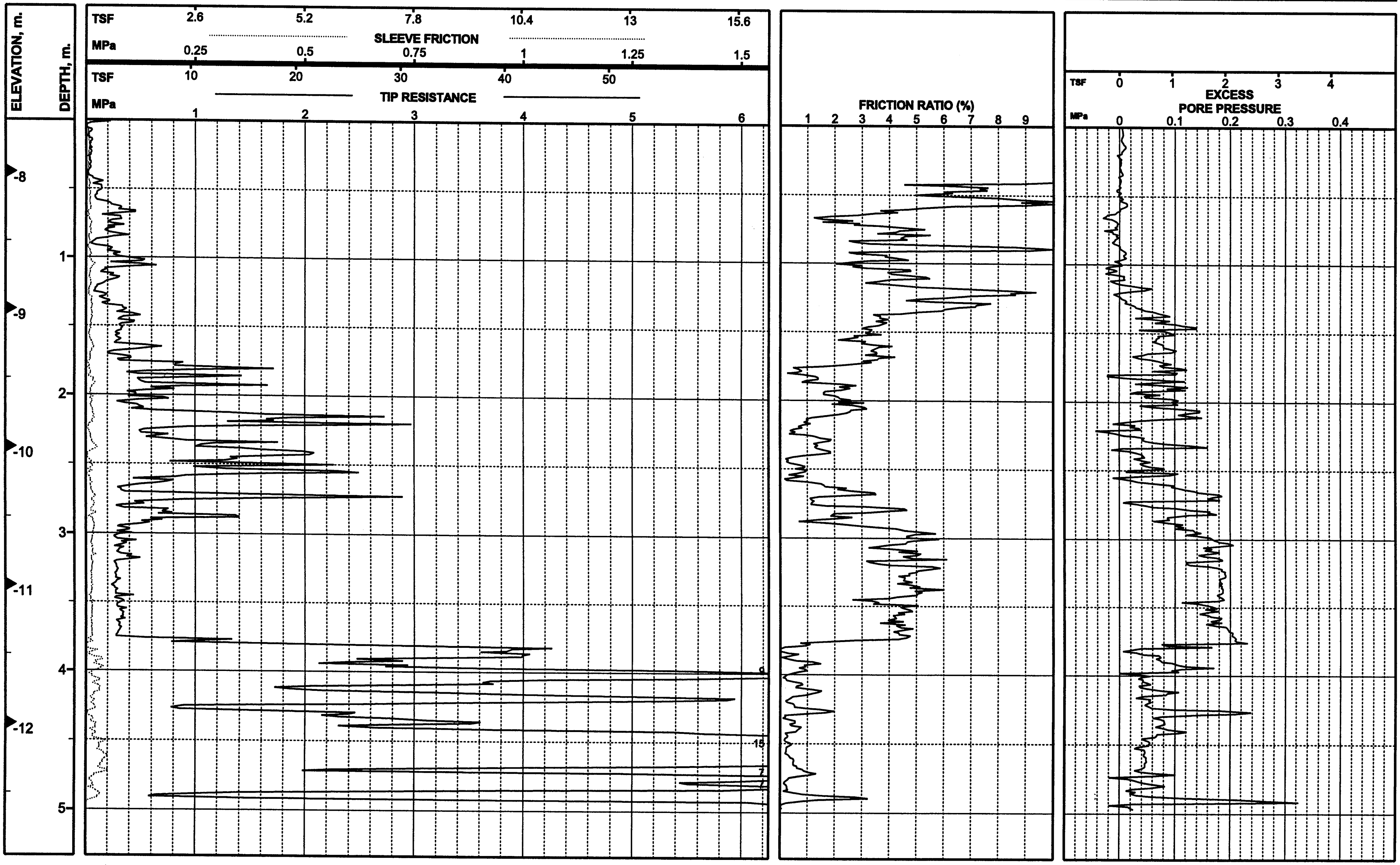
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-415

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1837271 N648019 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-416 (Skyway Frame 1)	MUDLINE ELEVATION:	-7.6 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

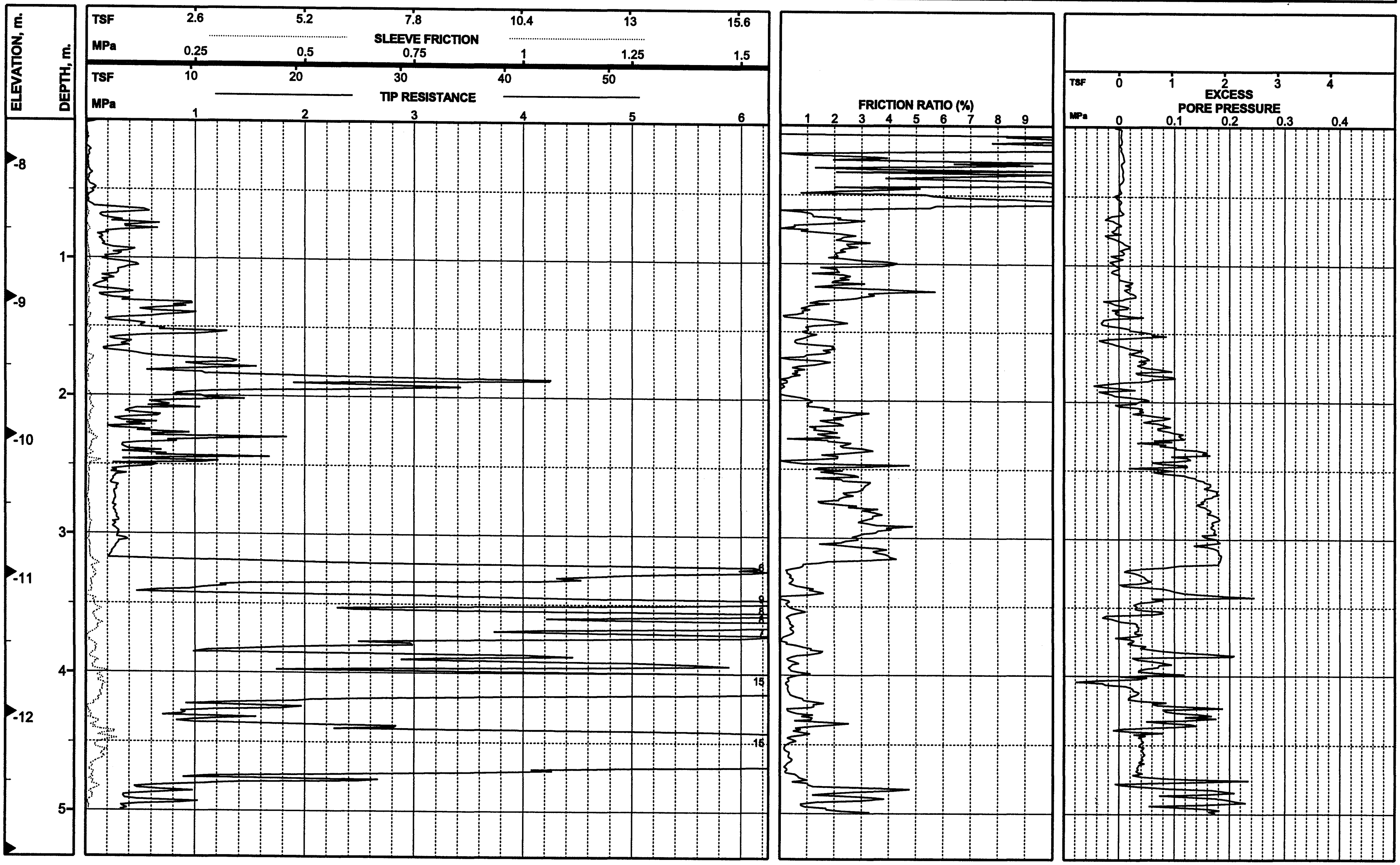
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-416

SFOBB East Span Seismic Safety Project

PLATE 98-416

PROJECT NO:	98-42-0054	COORDINATES:	E1837272 N647998 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-417 (Skyway Frame 1)	MUDLINE ELEVATION:	-7.7 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

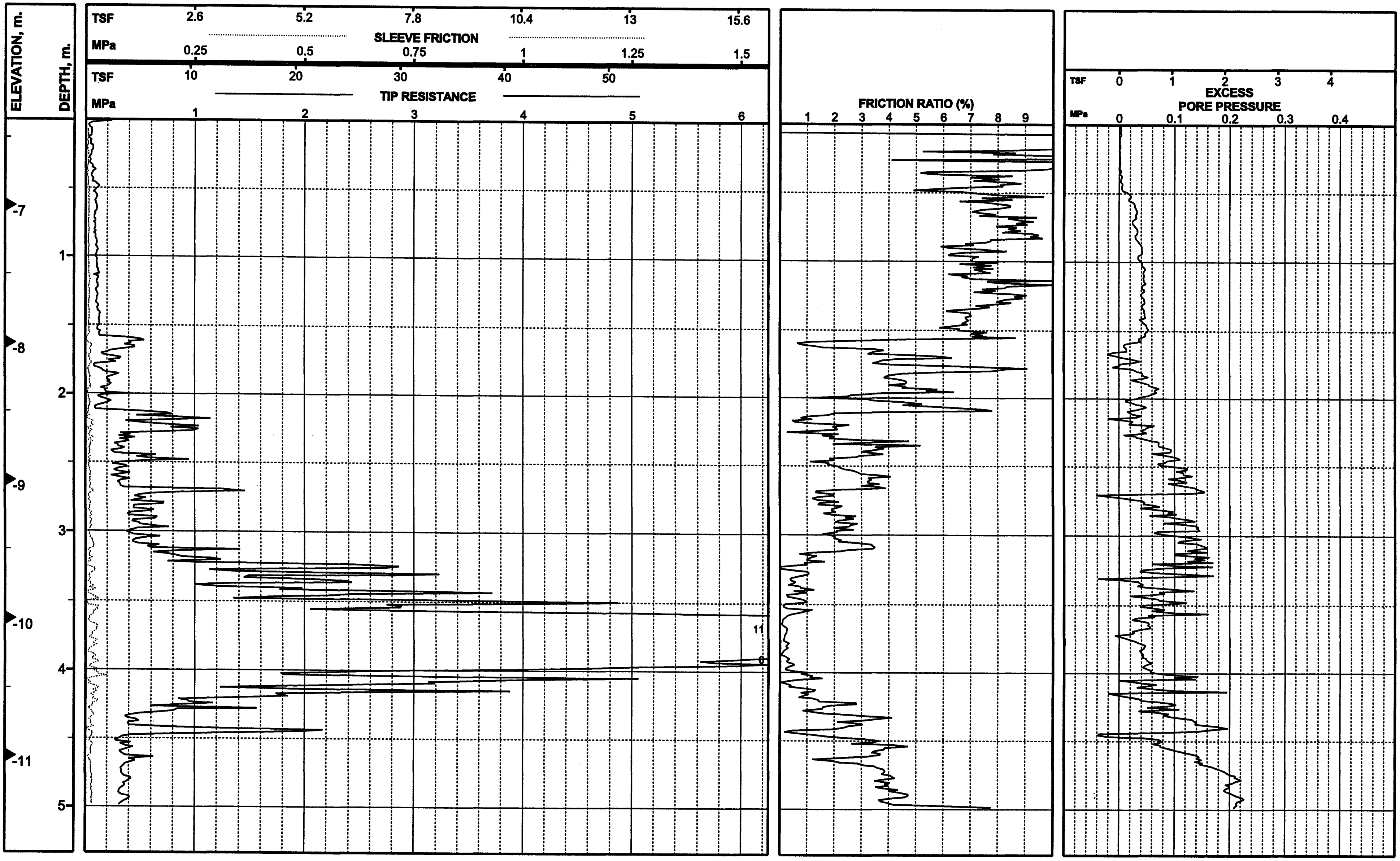
TETHERED SEASCOUT SOUNDING 98C-417

SFOBB East Span Seismic Safety Project

FUGRO

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837385 N648055 (CA State Plane Zone 3, NAD83, Meters)
EXPLORATION NO.:	98C-418 (Skyway Frame 2)	**MUDLINE ELEVATION:**	-6.4 m (MSL)
VESSEL:	MV White Lightning	**TEST DATE:**	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

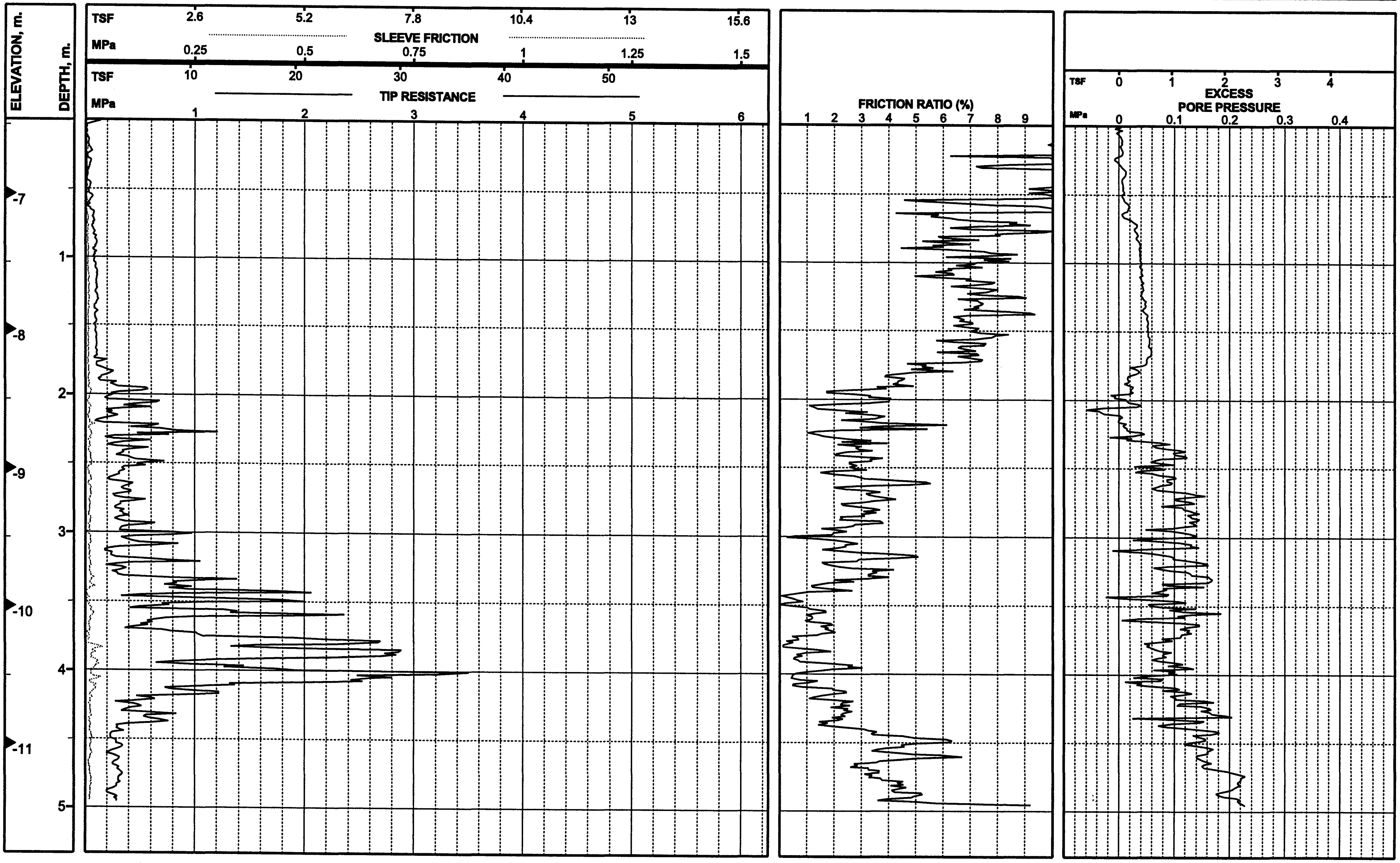
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-418

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1837380 N648028 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-419 (Skyway Frame 2)	MUDLINE ELEVATION:	-6.5 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

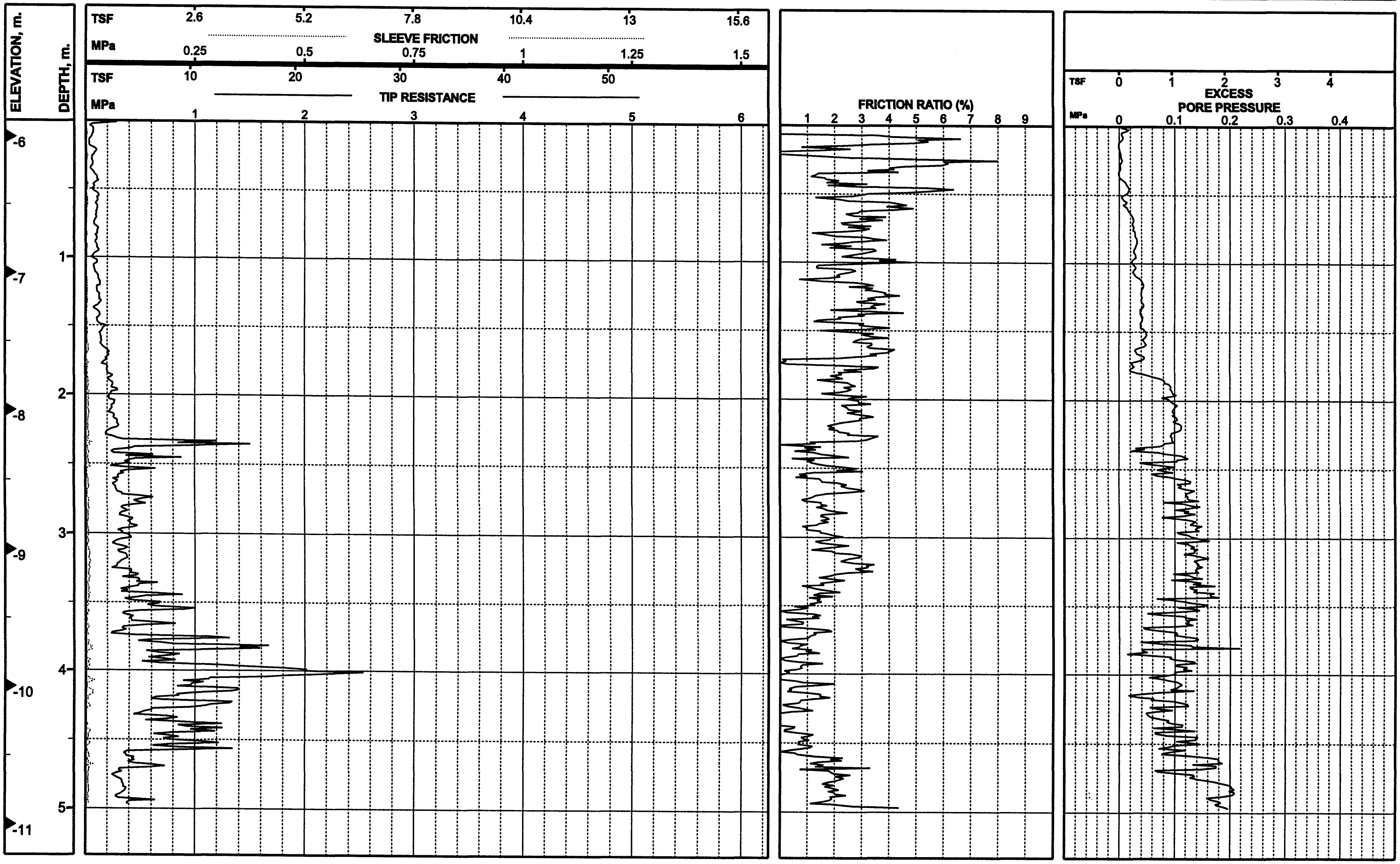
Report Date: 05/11/99

LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-419

SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837443 N648069 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-420 (Skyway Frame 2)	**MUDLINE ELEVATION:**	-5.9 m (MSL)	**TEST DATE:**	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

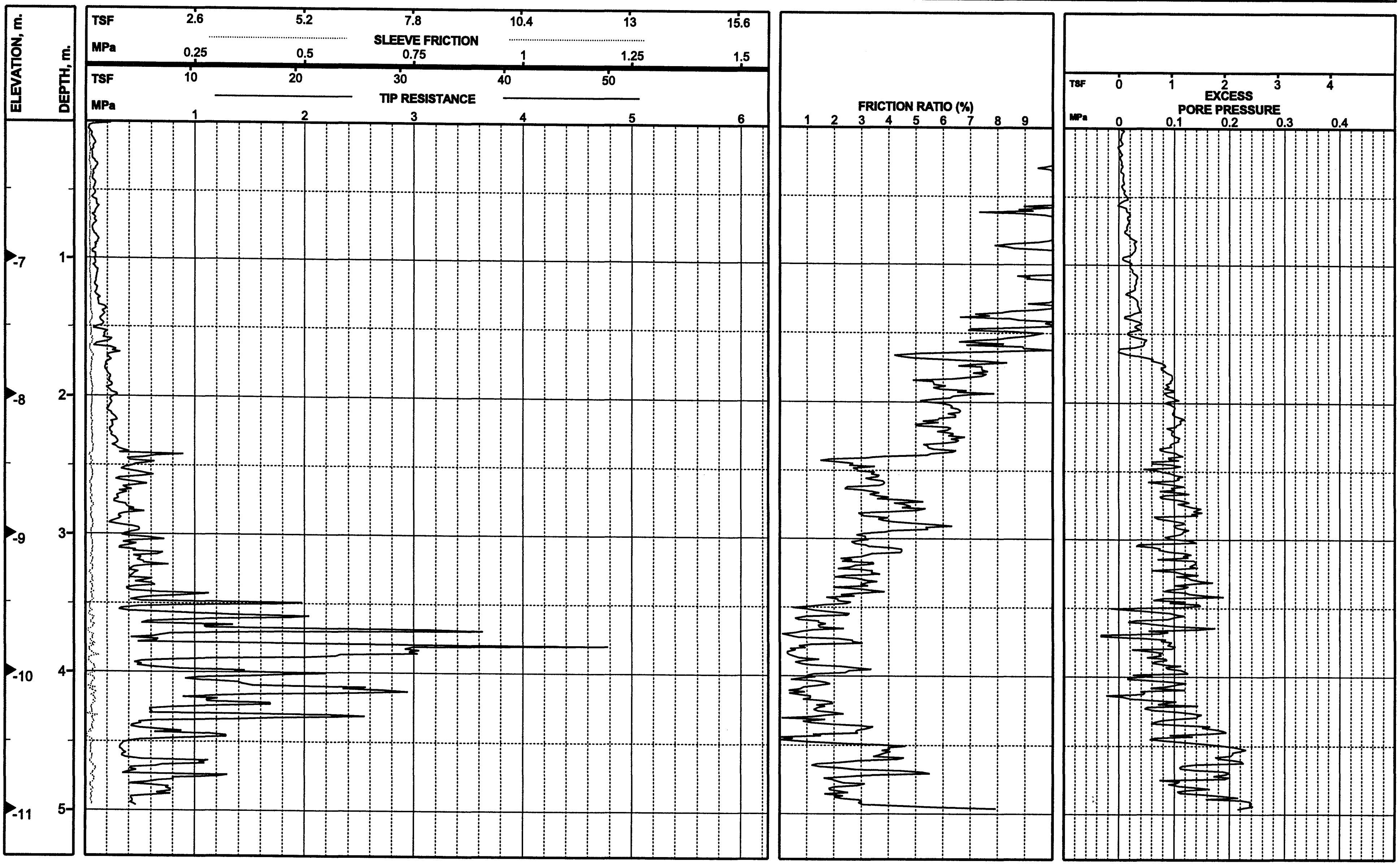
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-420

SFOBB East Span Seismic Safety Project

FUGRO

PROJECT NO: 98-42-0054	**COORDINATES:** E1837446 N648026 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning
EXPLORATION NO.: 98C-421 (Skyway Frame 2)	**MUDLINE ELEVATION:** -6.0 m (MSL)	**TEST DATE:** 12/14/98

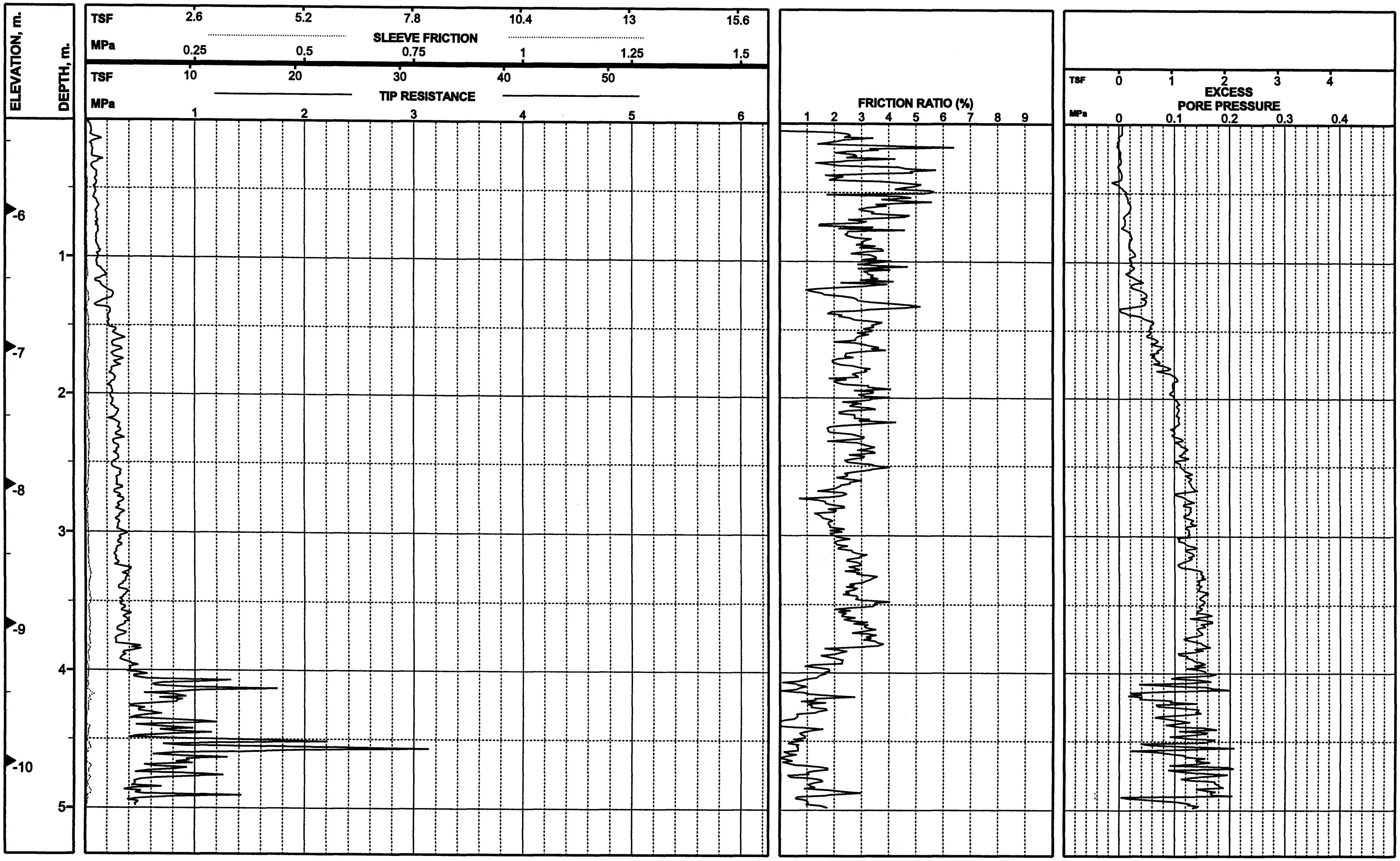


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-421
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO: 98-42-0054	**COORDINATES:** E1837523 N648076 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning	
EXPLORATION NO.: 98C-422 (Skyway Frame 3)	**MUDLINE ELEVATION:** -5.3 m (MSL)	**TEST DATE:** 12/15/98	



NOTE: SeaScout CPT uses 1 sq. cm cone

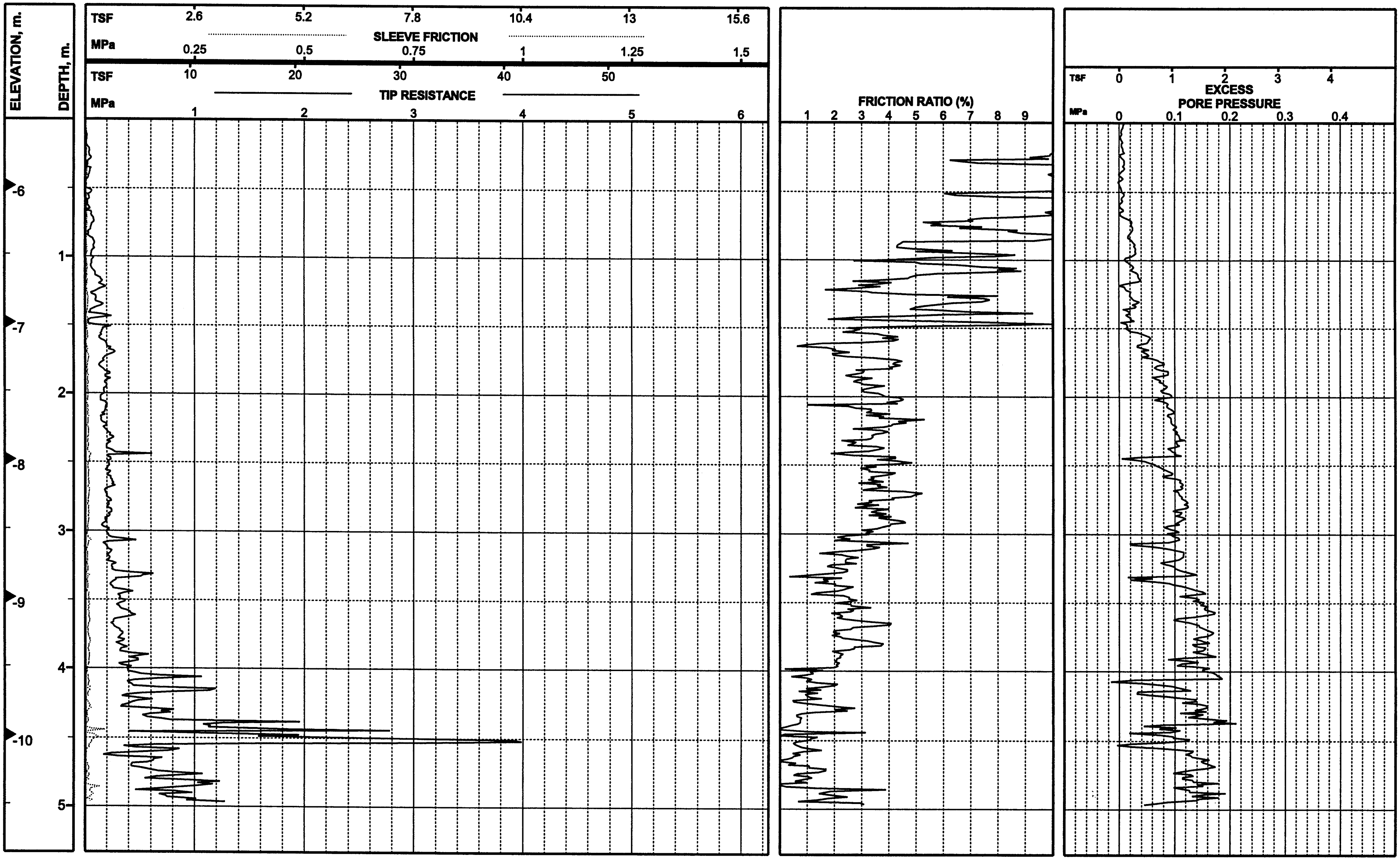
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-422

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1837531 N648031 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-423 (Skyway Frame 3)	MUDLINE ELEVATION:	-5.5 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

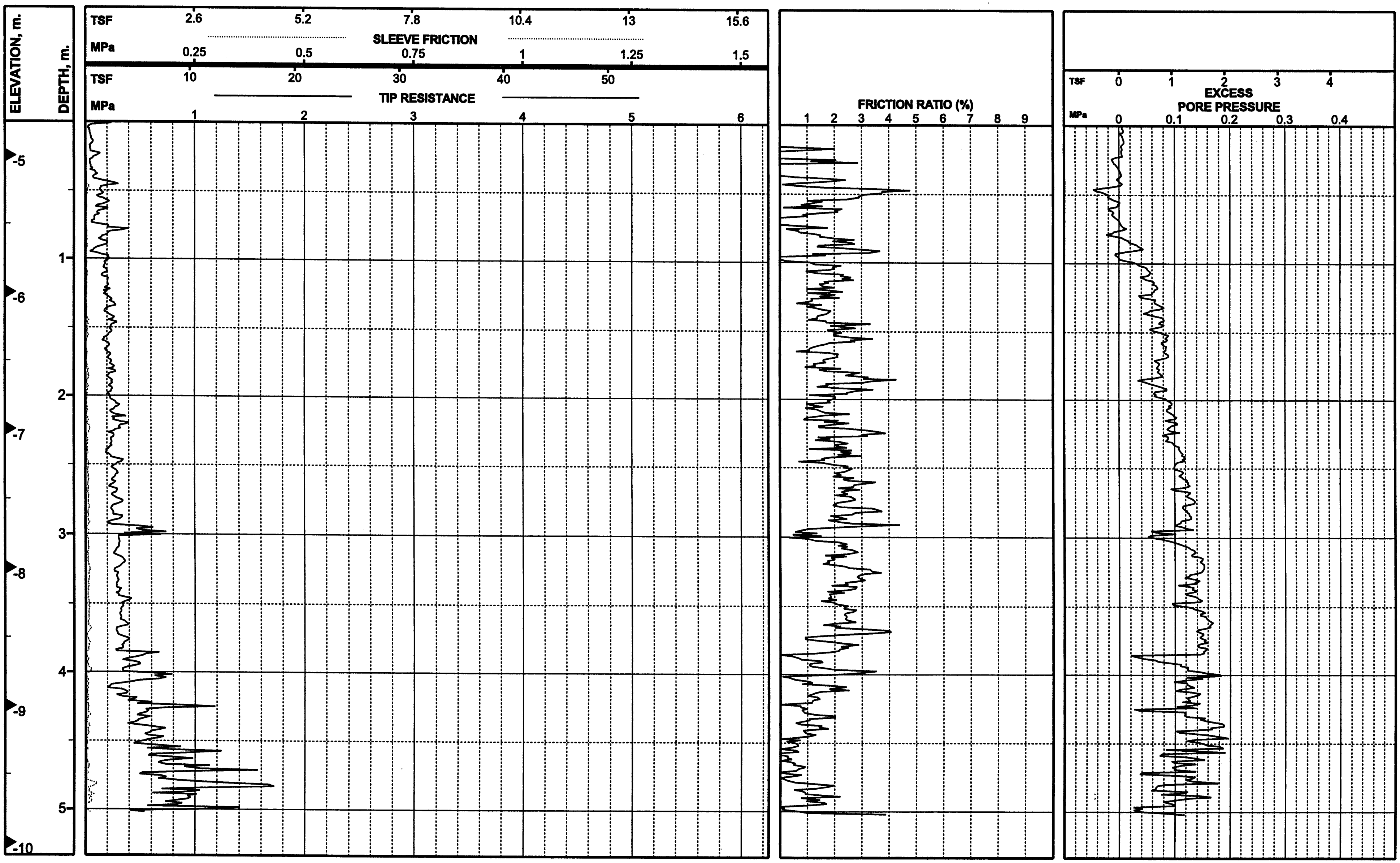
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-423

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1837612 N648102 (CA State Plane Zone 3, NAD83, Meters)
EXPLORATION NO.:	98C-424 (Skyway Frame 2)	MUDLINE ELEVATION:	-4.8 m (MSL)
VESSEL:	MV White Lightning	TEST DATE:	12/15/98



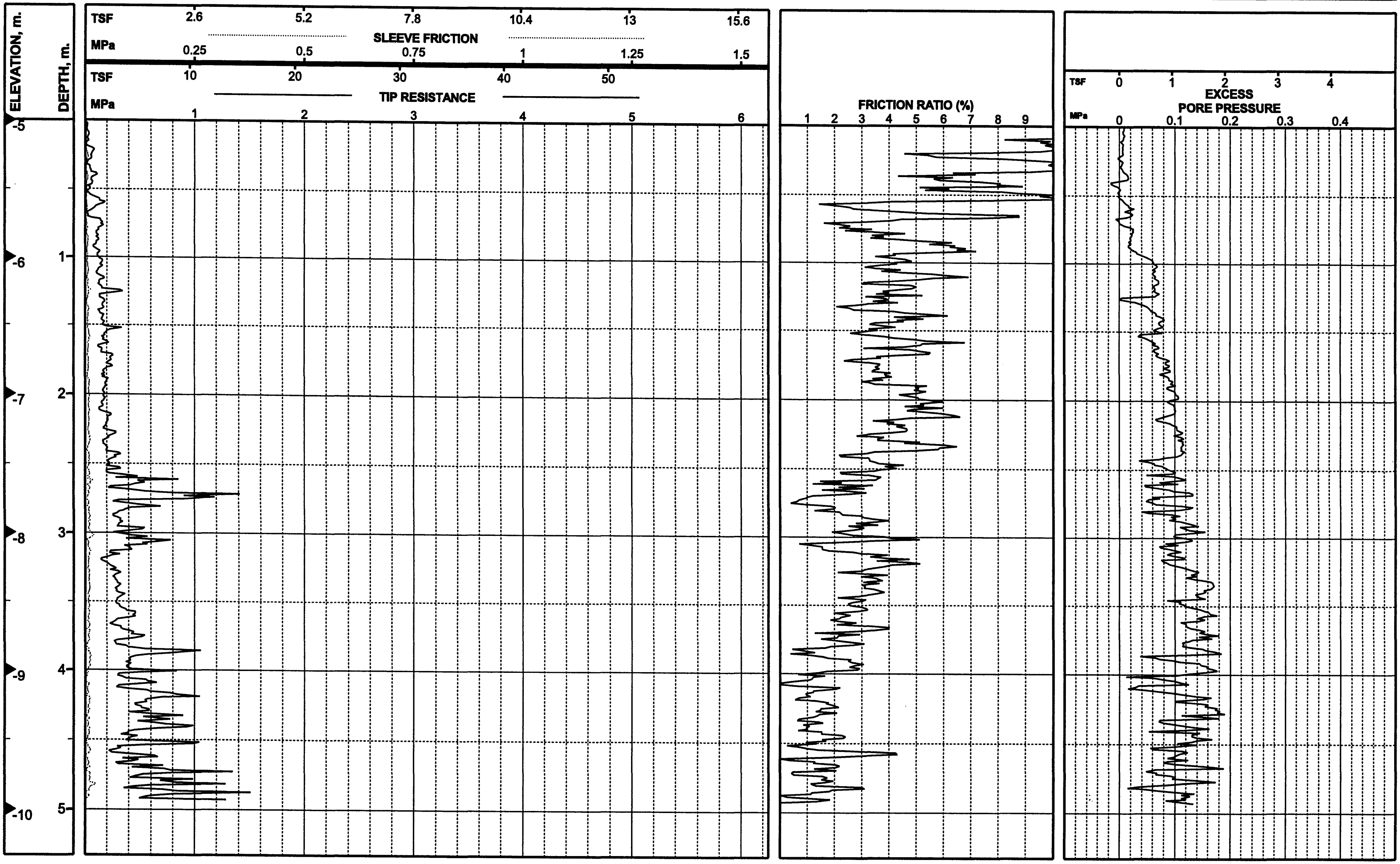
NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-424
SFOBB East Span Seismic Safety Project

FUGRO

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1837623 N648046 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-425 (Skyway Frame 3)	MUDLINE ELEVATION:	-5.0 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

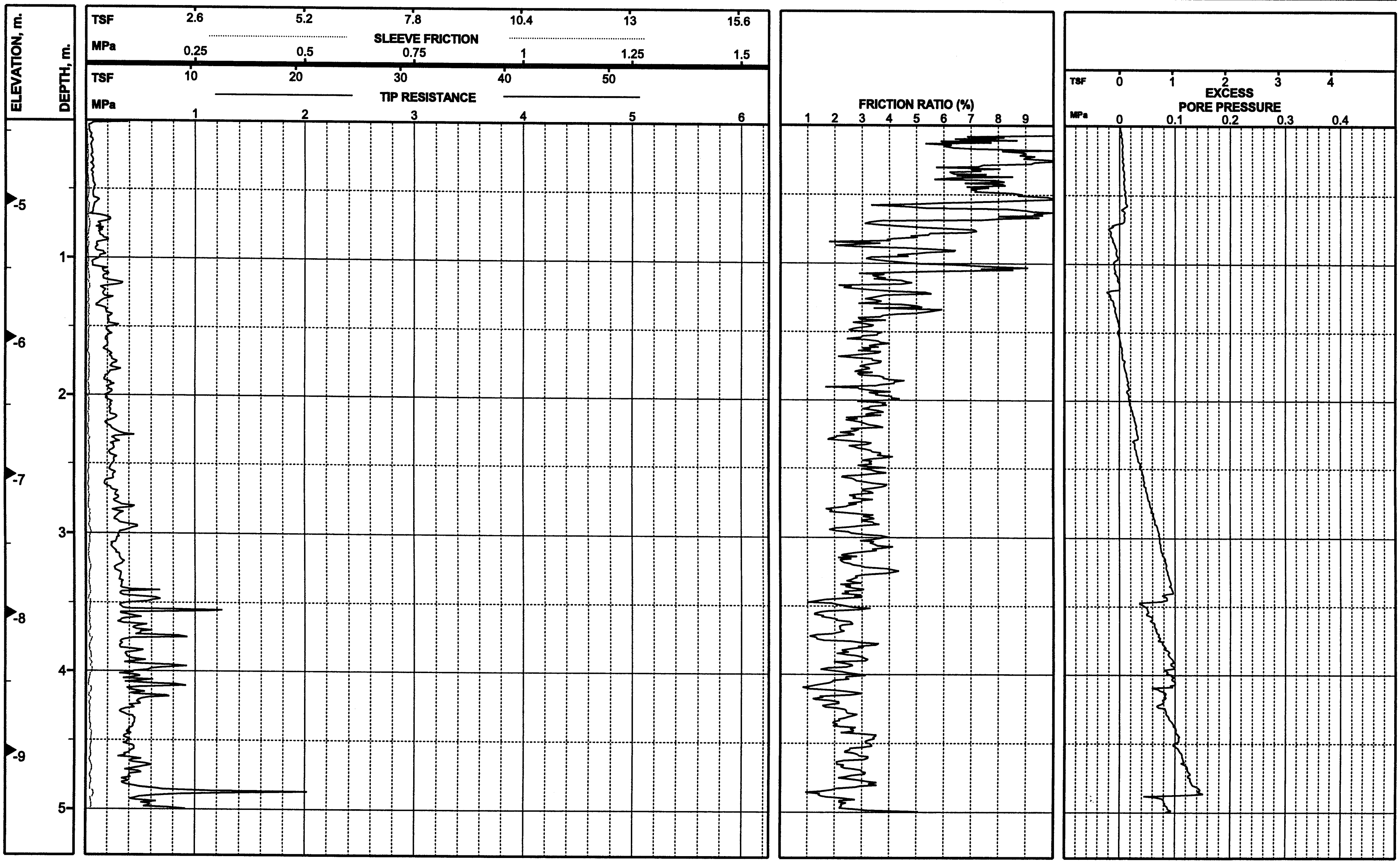
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-425

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837755 N648121 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-426 (Skyway Frame 2)	**MUDLINE ELEVATION:**	-4.4 m (MSL)	**TEST DATE:**	12/17/98

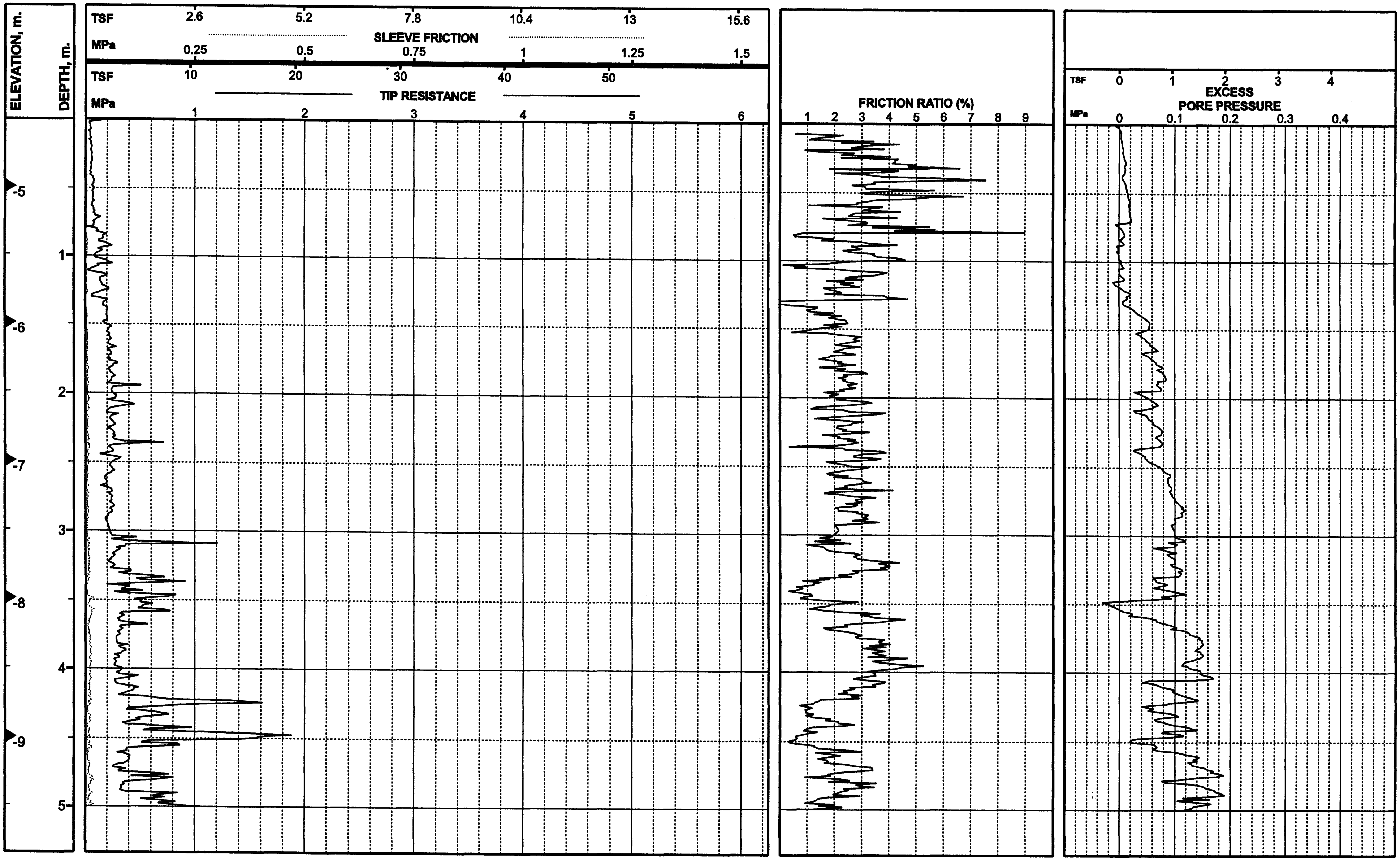


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-426
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO: 98-42-0054	**COORDINATES:** E1837768 N648068 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning	
EXPLORATION NO.: 98C-427 (Skyway Frame 2)	**MUDLINE ELEVATION:** -4.5 m (MSL)	**TEST DATE:** 12/14/98	



NOTE: SeaScout CPT uses 1 sq. cm cone

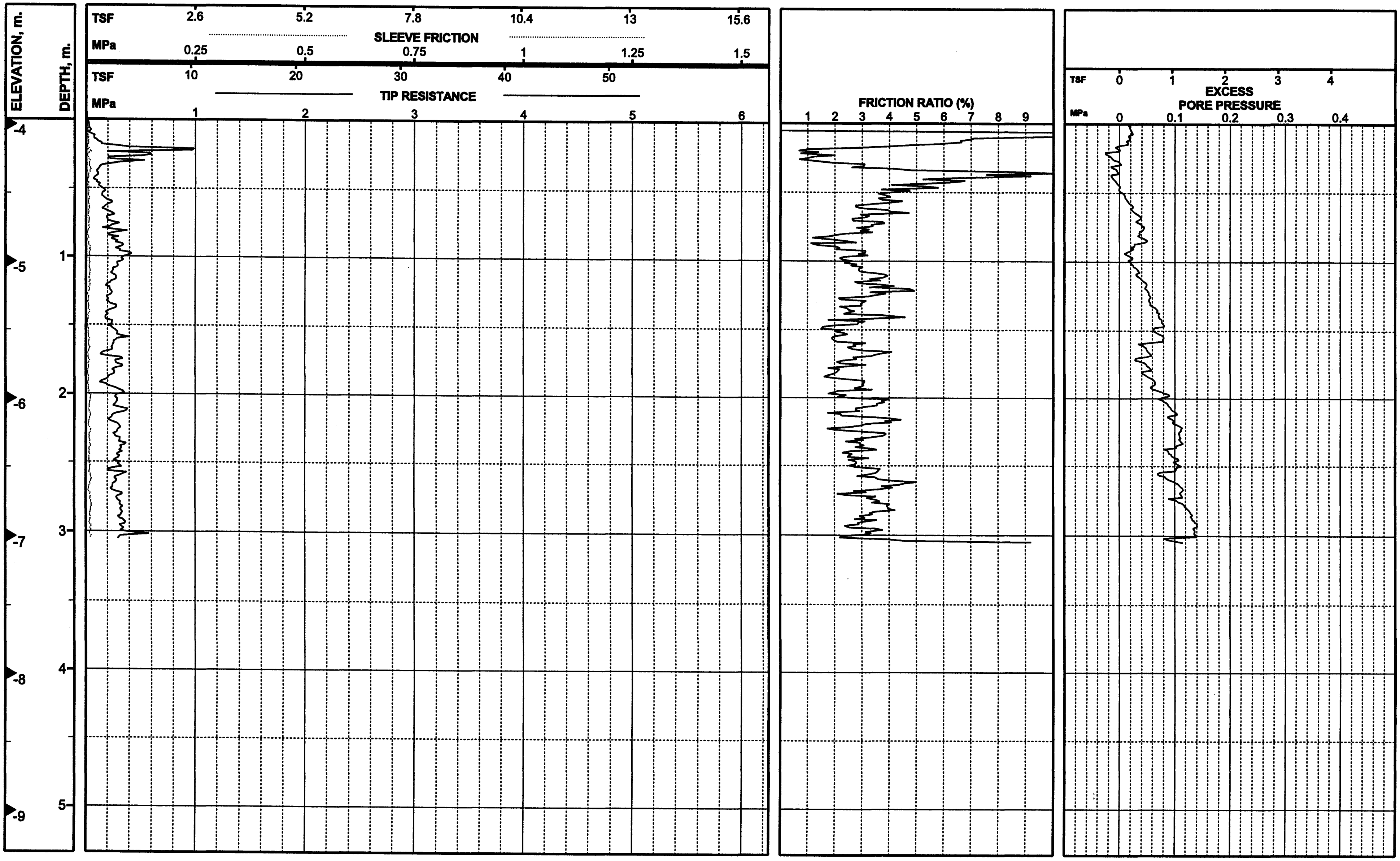
Report Date: 05/11/99

LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-427

SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	**COORDINATES:**	E1837916 N648122 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-428 (Skyway Frame 3)	**MUDLINE ELEVATION:**	-4.0 m (MSL)	**TEST DATE:**	12/14/98



NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

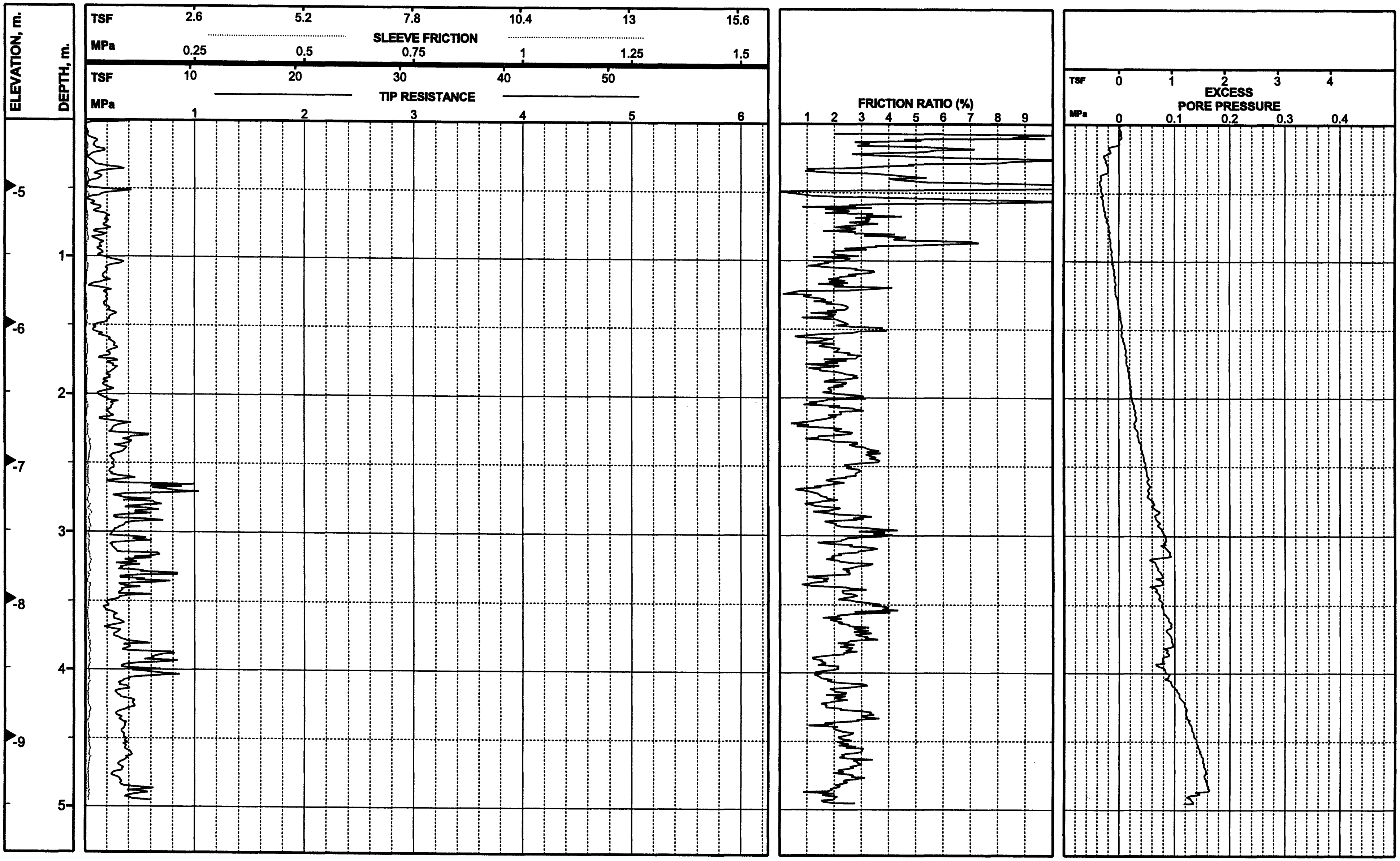
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-428

SFOBB East Span Seismic Safety Project

FUGRO

PROJECT NO:	98-42-0054	COORDINATES:	E1837907 N648090 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-429 (Skyway Frame 3)	MUDLINE ELEVATION:	-4.5 m (MSL)	TEST DATE:	12/17/98



NOTE: SeaScout CPT uses 1 sq. cm cone

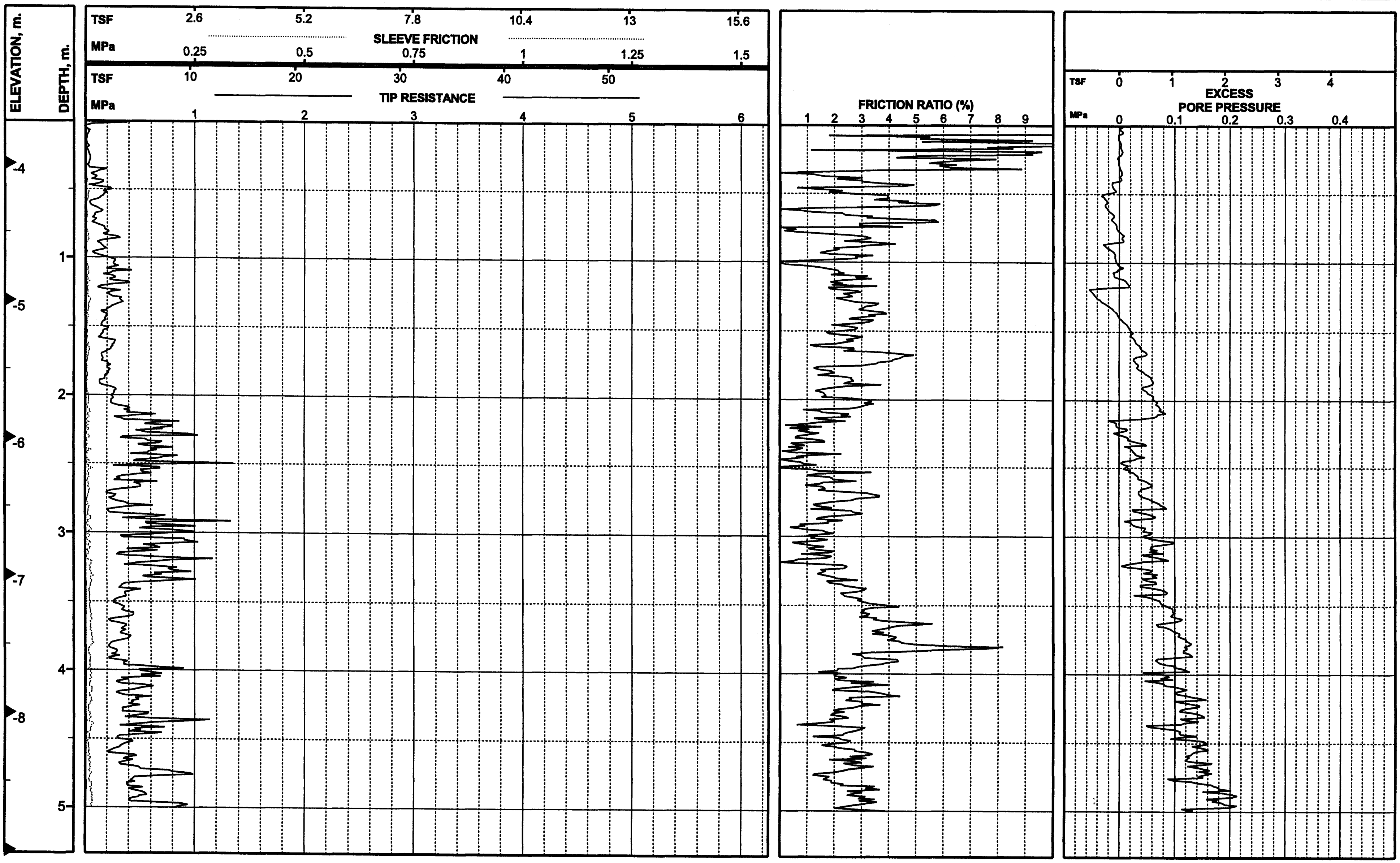
Report Date: 05/11/99

LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-429

SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838075 N648159 (CA State Plane Zone 3, NAD83, Meters)
EXPLORATION NO.:	98C-430 (Skyway Frame 3)	**MUDLINE ELEVATION:**	-3.7 m (MSL)
VESSEL:	MV White Lightning	**TEST DATE:**	12/14/98

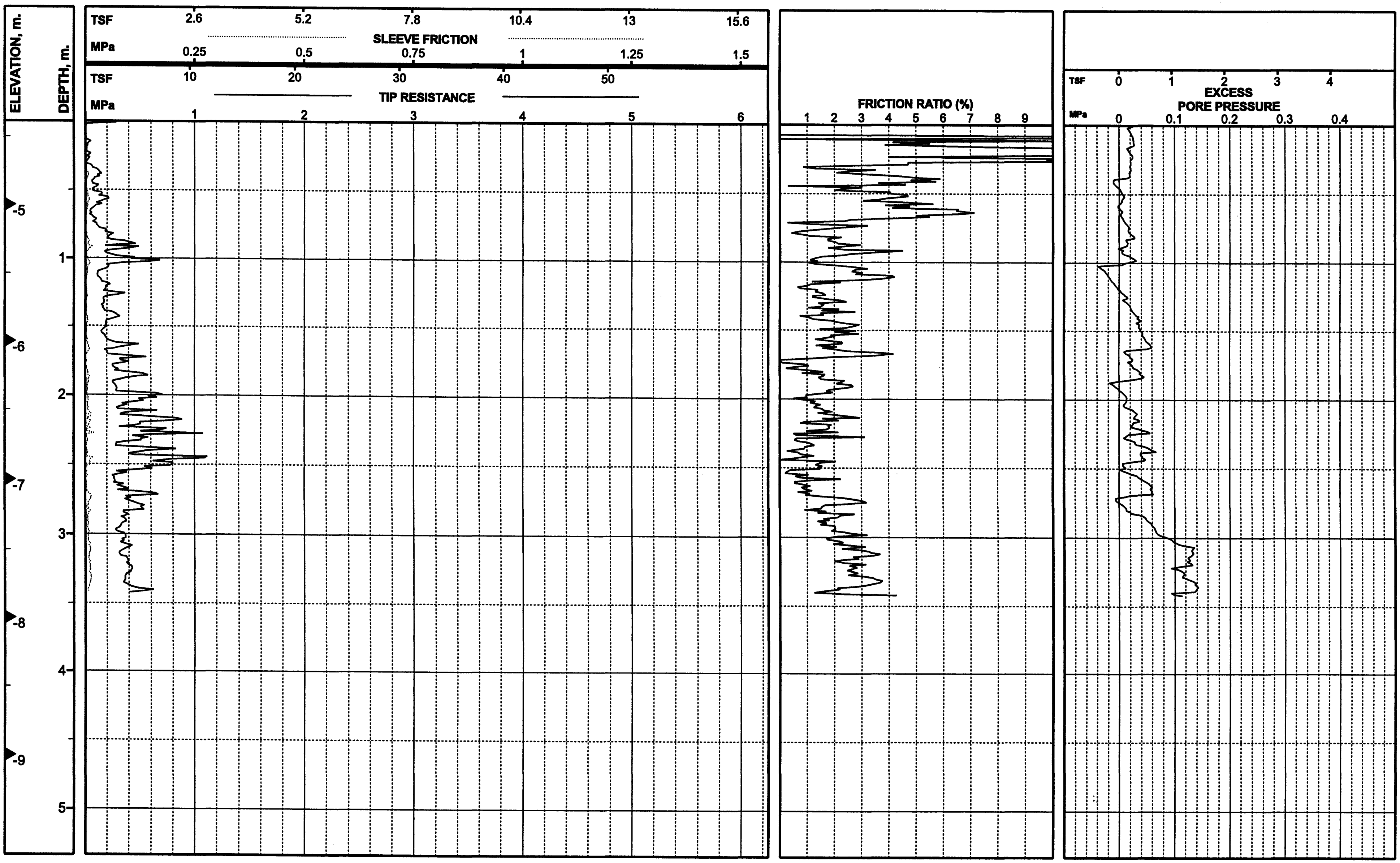


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-430
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO: 98-42-0054	**COORDINATES:** E1838080 N648122 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning
EXPLORATION NO.: 98C-431 (Skyway Frame 3)	**MUDLINE ELEVATION:** -4.4 m (MSL)	**TEST DATE:** 12/14/98



NOTE: SeaScout CPT uses 1 sq. cm cone

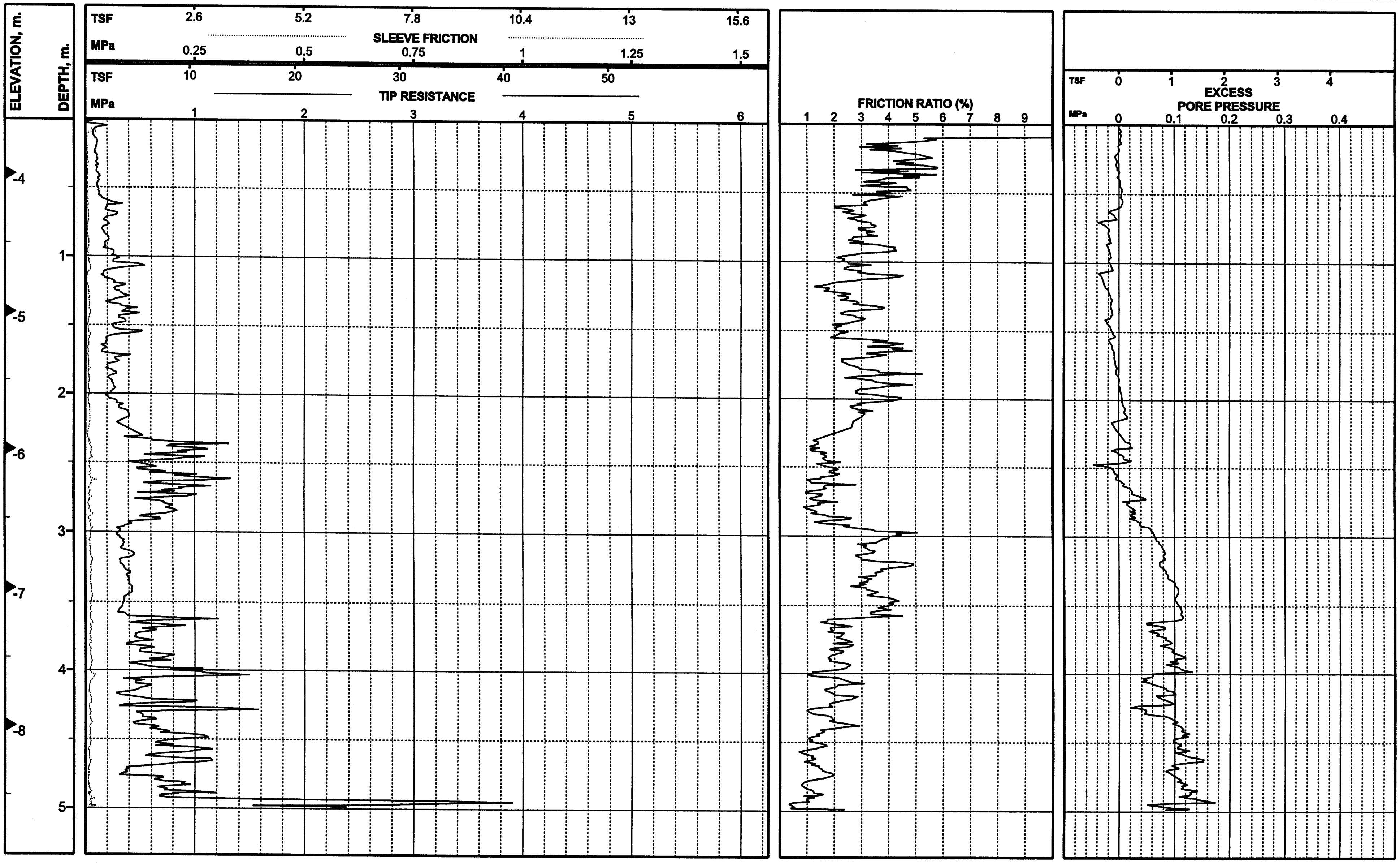
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-431

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838215 N648189 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-432 (Skyway Frame 3)	**MUDLINE ELEVATION:**	-3.6 m (MSL)	**TEST DATE:**	12/17/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

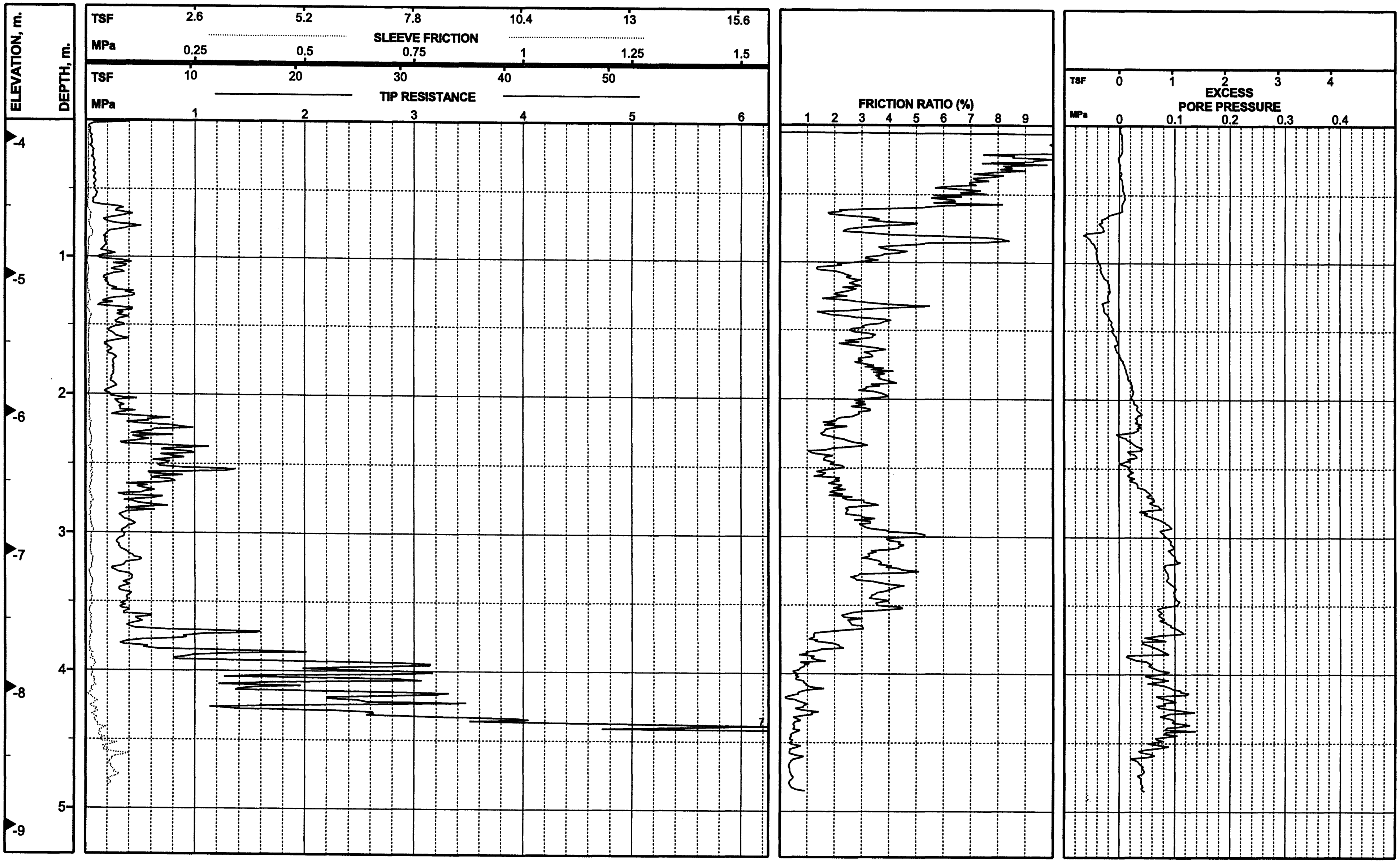
TETHERED SEASCOUT SOUNDING 98C-432

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PLATE 98-432

PROJECT NO: 98-42-0054	**COORDINATES:** E1838224 N648143 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning	
EXPLORATION NO.: 98C-433 (Skyway Frame 1)	**MUDLINE ELEVATION:** -3.9 m (MSL)	**TEST DATE:** 12/17/98	



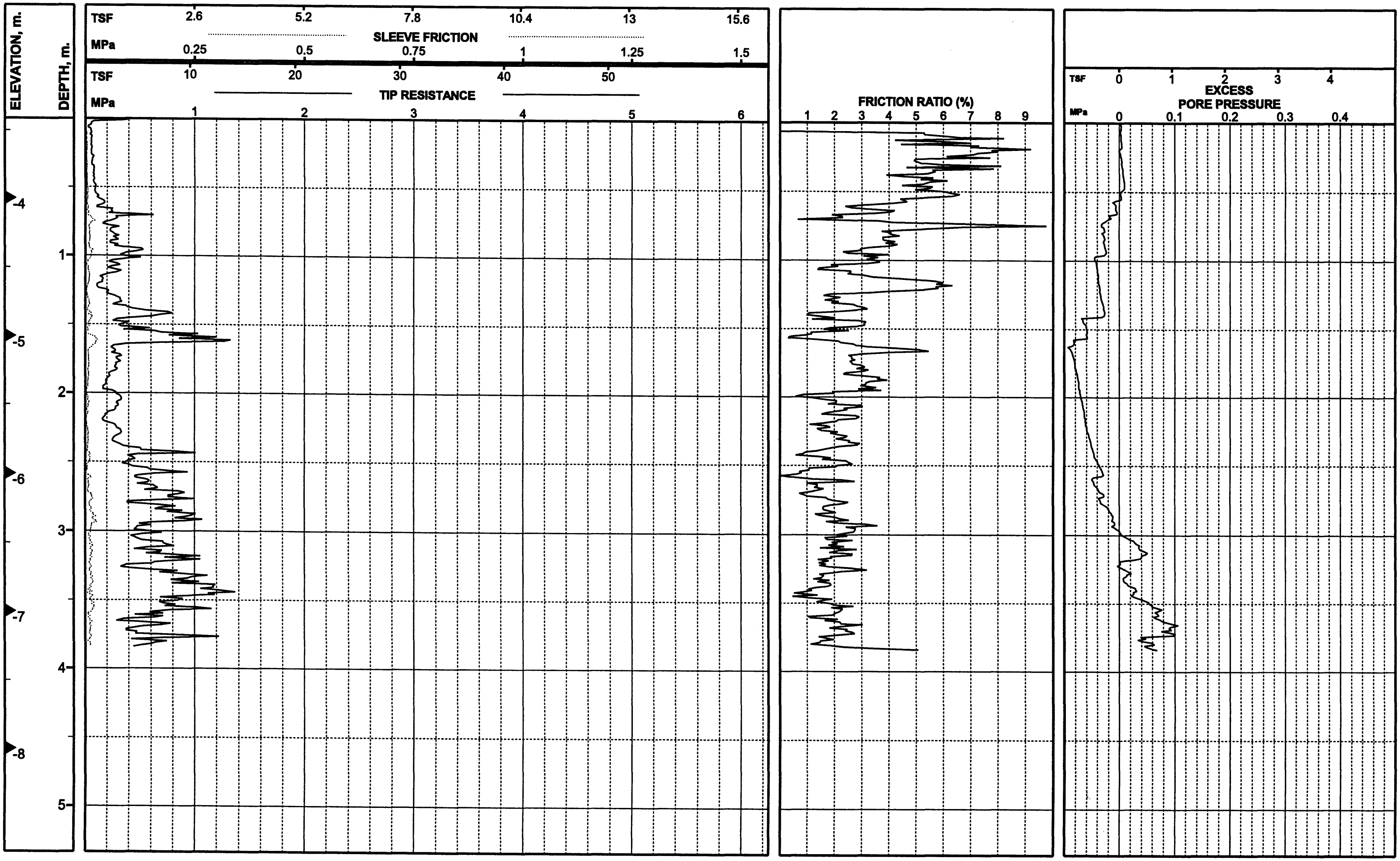
NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-433
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

FUGRO

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838341 N648218 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-434 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-3.4 m (MSL)	**TEST DATE:**	12/14/98



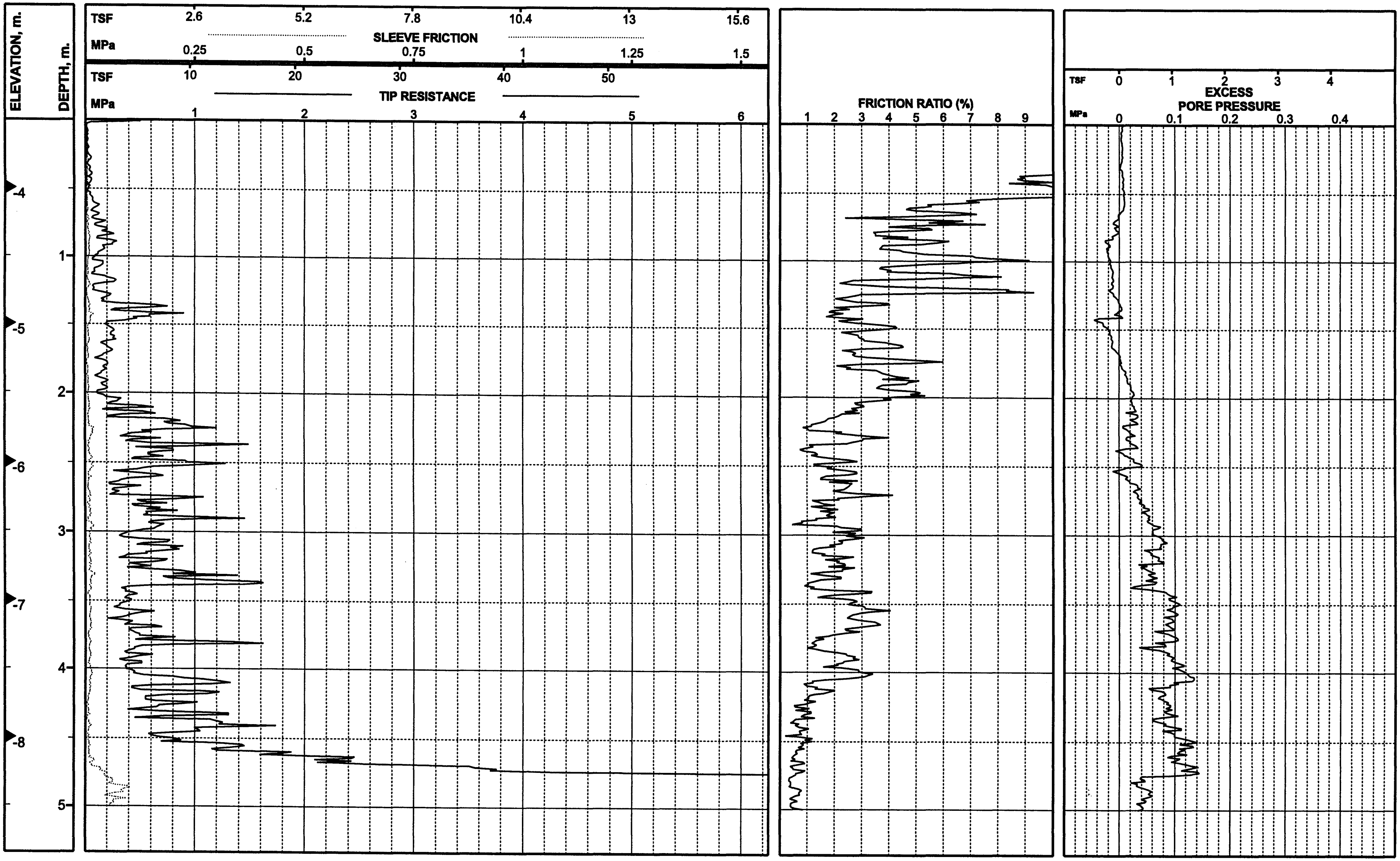
NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-434
SFOBB East Span Seismic Safety Project

FUGRO

PROJECT NO: 98-42-0054	**COORDINATES:** E1838347 N648163 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning
EXPLORATION NO.: 98C-435 (Skyway Frame 3)	**MUDLINE ELEVATION:** -3.5 m (MSL)	**TEST DATE:** 12/14/98



NOTE: SeaScout CPT uses 1 sq. cm cone

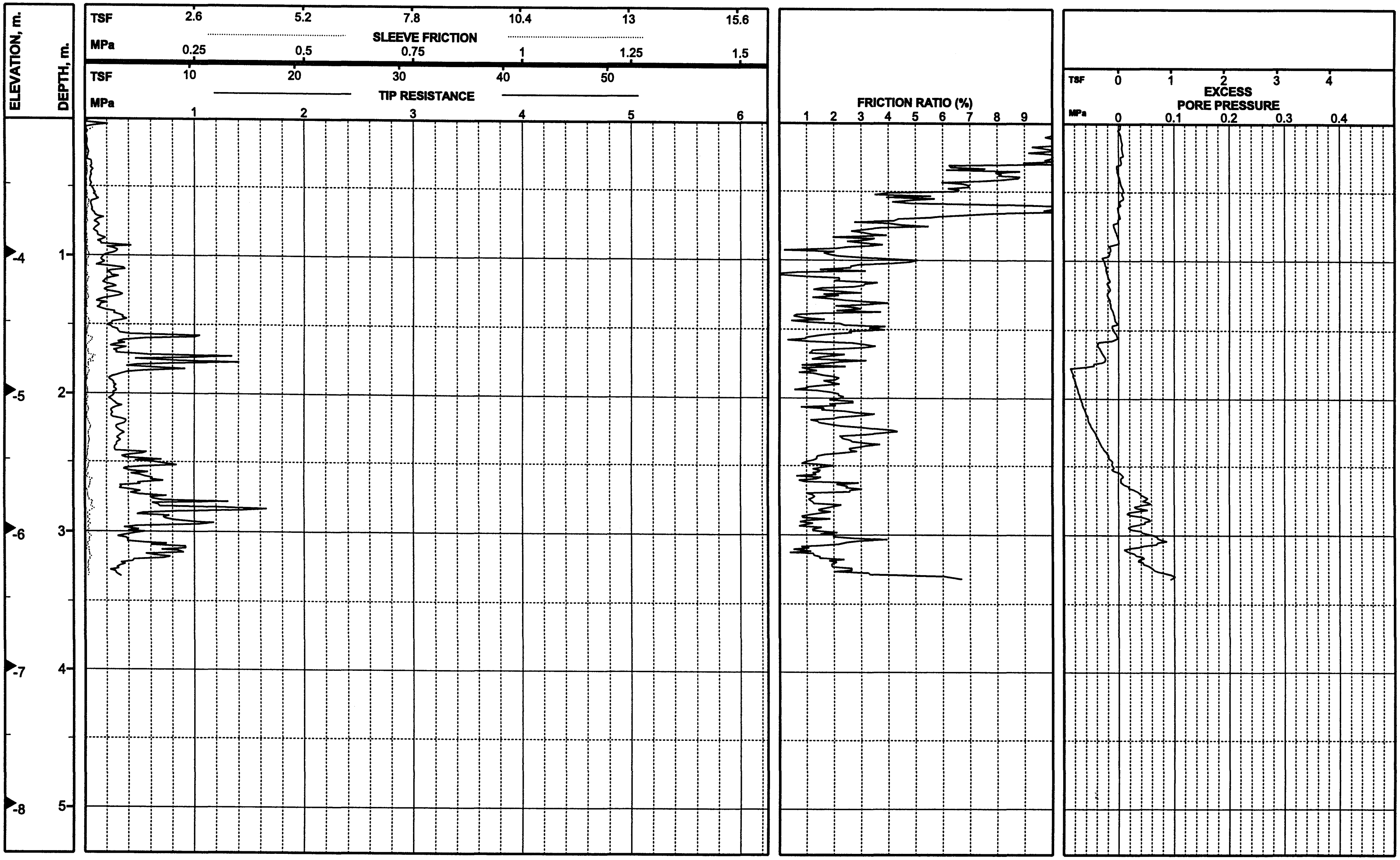
Report Date: 05/11/99

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-435
SFOBB East Span Seismic Safety Project

FUGRO

PLATE 98-435

PROJECT NO: 98-42-0054	**COORDINATES:** E1838451 N648229 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning
EXPLORATION NO.: 98C-436 (Skyway Frame 4)	**MUDLINE ELEVATION:** -3.0 m (MSL)	**TEST DATE:** 12/14/98

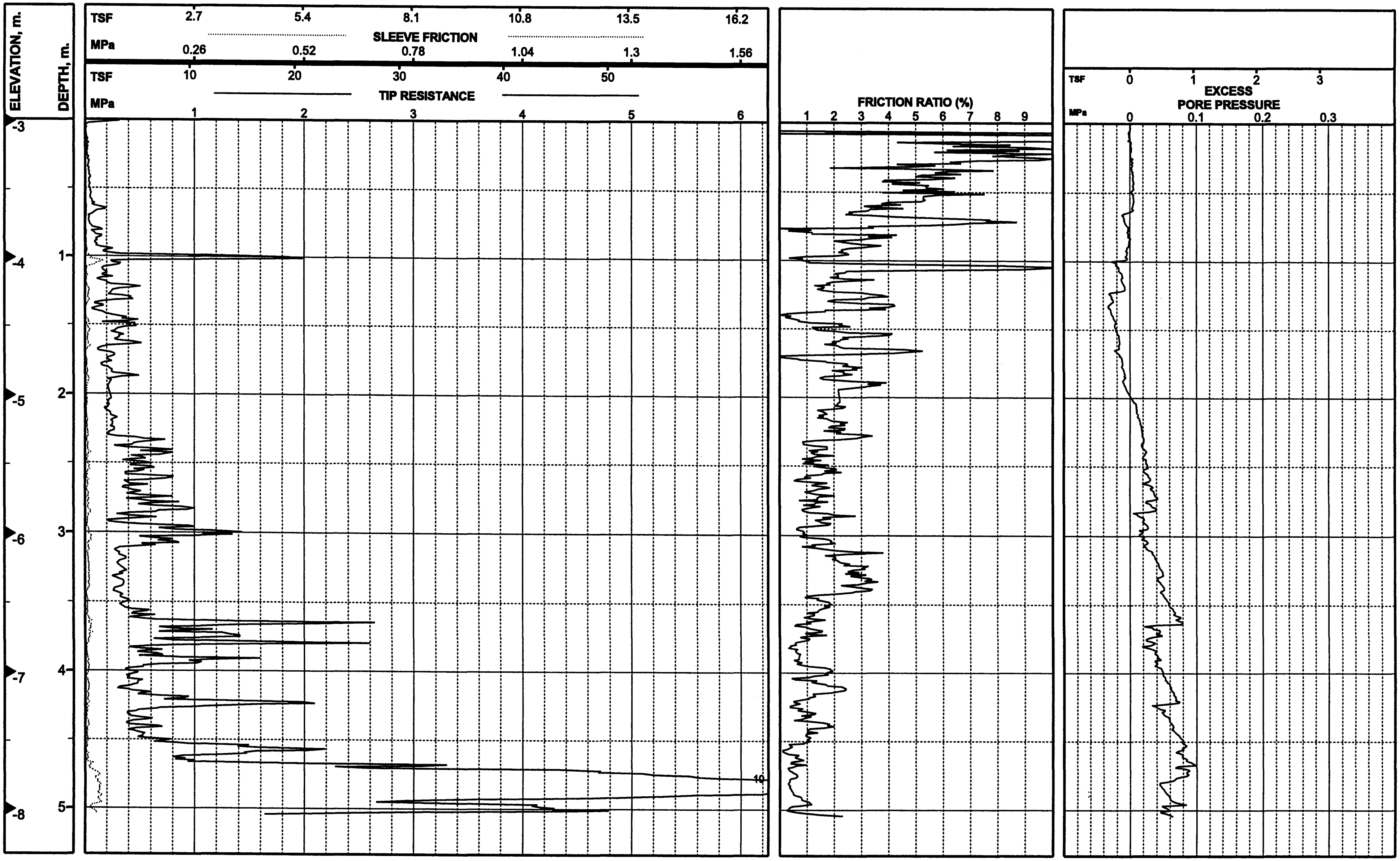


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-436
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E648188 N1838455 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-437 (Skyway Frame 1)	MUDLINE ELEVATION:	-3.0 m (MSL)	TEST DATE:	12/18/98



NOTE: SeaScout CPT uses 1 sq. cm cone

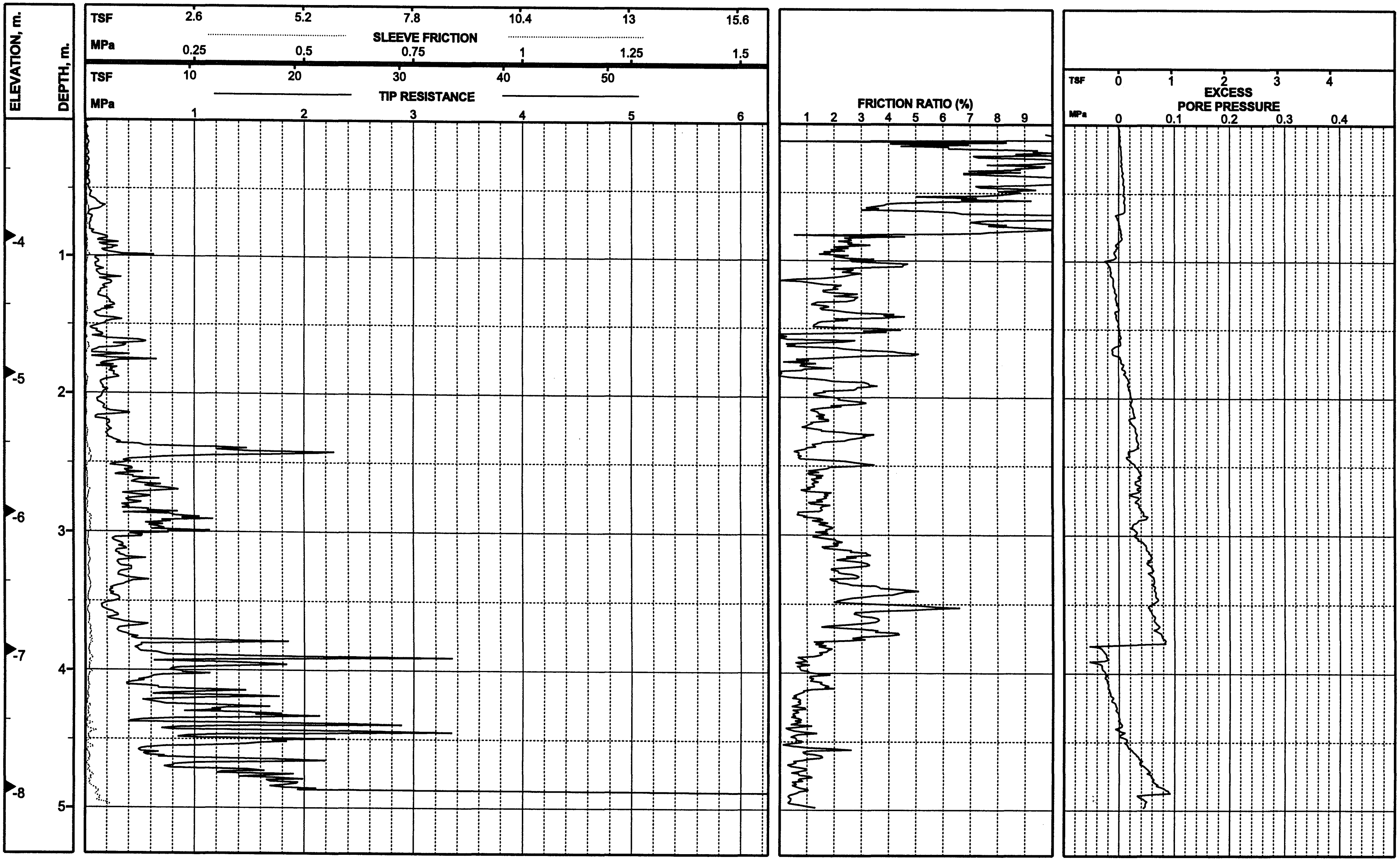
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-437

SFOBB East Span Seismic Safety Project

Report Date: 05/14/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838537 N648241 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-438 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-3.1 m (MSL)	**TEST DATE:**	12/18/98



NOTE: SeaScout CPT uses 1 sq. cm cone

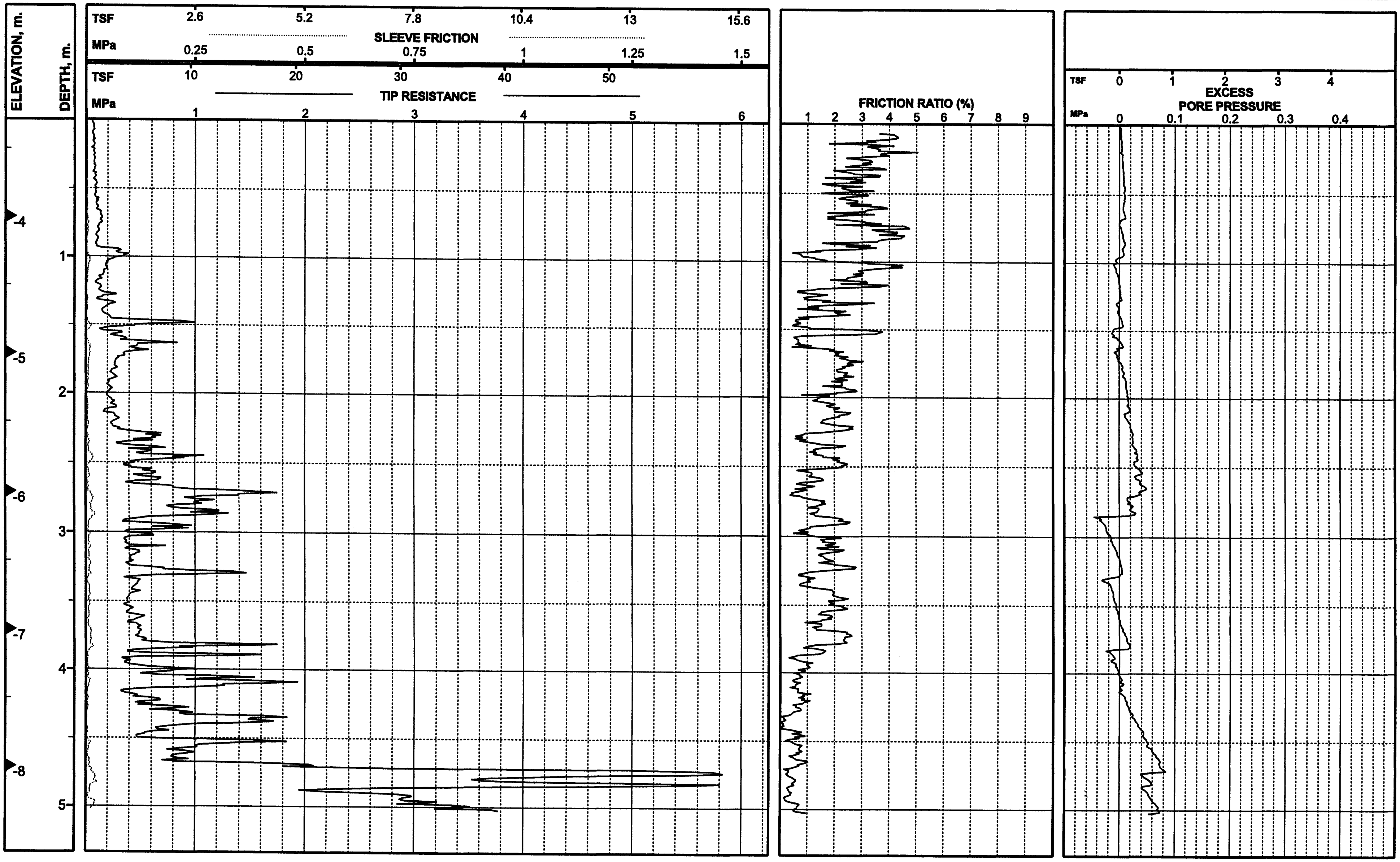
Report Date: 05/11/99

LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-438

SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838545 N648195 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-439 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-3.3 m (MSL)	**TEST DATE:**	12/18/98



NOTE: SeaScout CPT uses 1 sq. cm cone

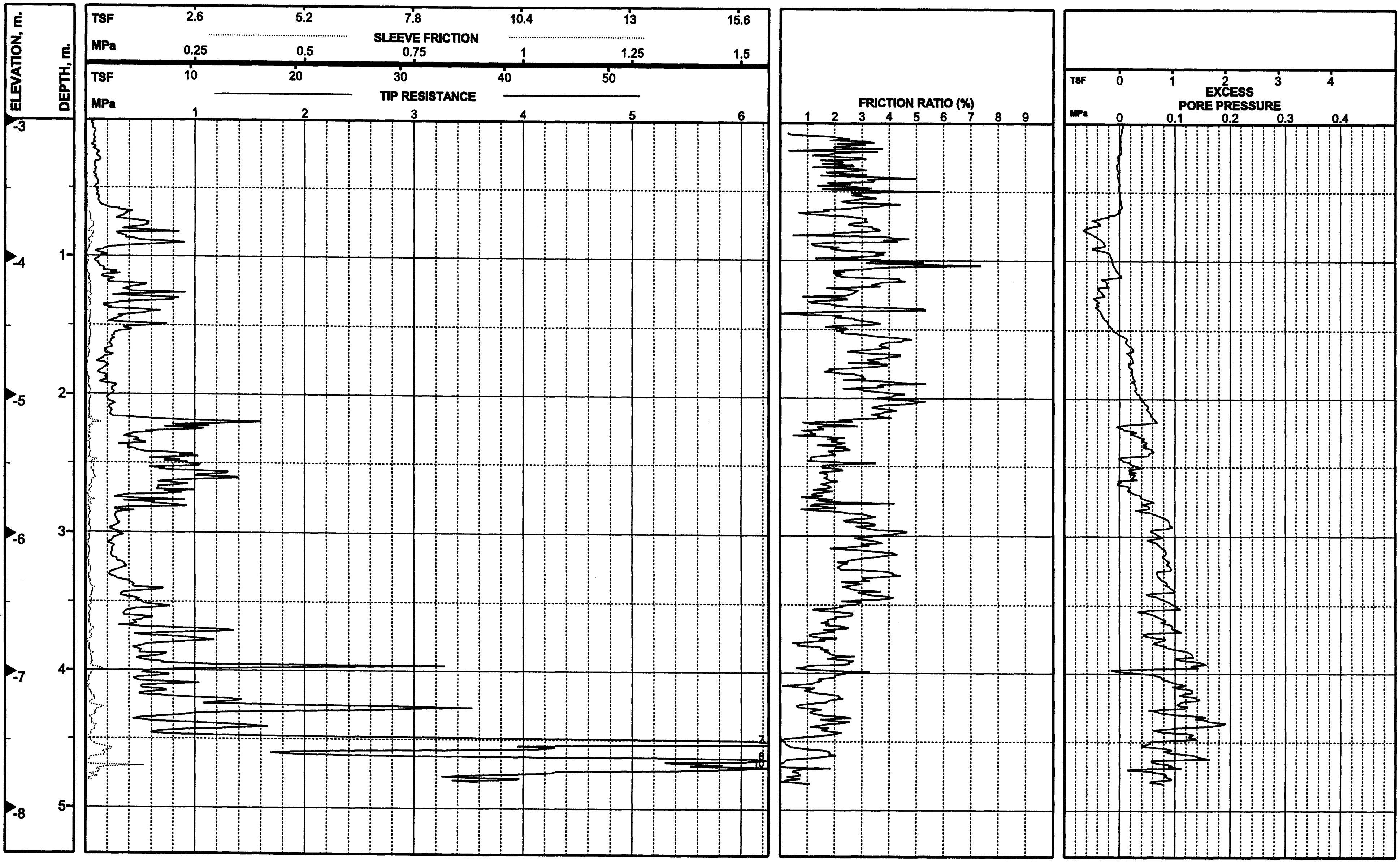
Report Date: 05/11/99

LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-439

SFOBB East Span Seismic Safety Project

PROJECT NO.: 98-42-0054	COORDINATES: E1838627 N648258 (CA State Plane Zone 3, NAD83, Meters)	VESSEL: MV White Lightning
EXPLORATION NO.: 98C-440 (Skyway Frame 5)	MUDLINE ELEVATION: -3.0 m (MSL)	TEST DATE: 12/18/98



NOTE: SeaScout CPT uses 1 sq. cm cone

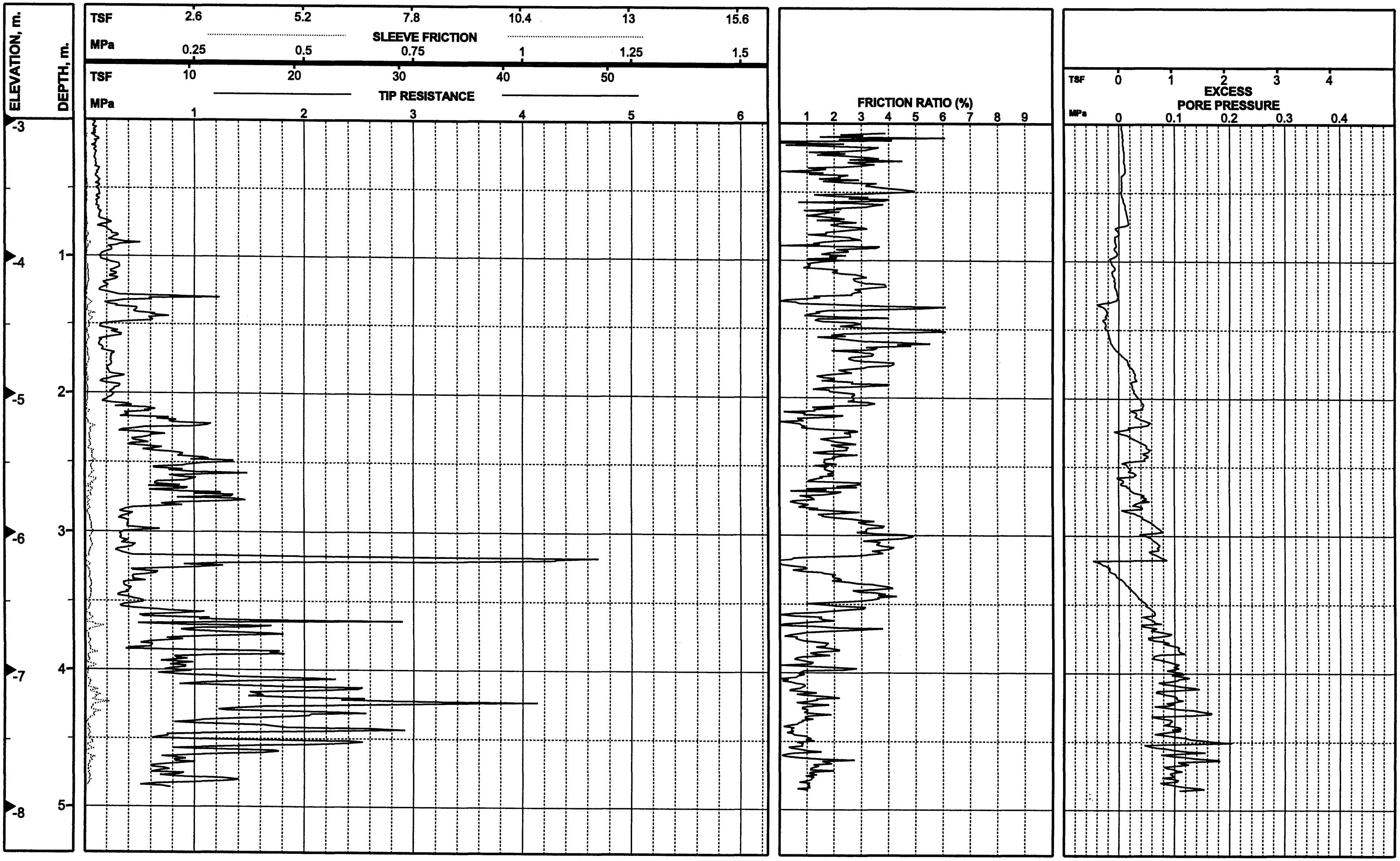
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-440

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1838632 N648196 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-441 (Skyway Frame 1)	MUDLINE ELEVATION:	-3.0 m (MSL)	TEST DATE:	12/18/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

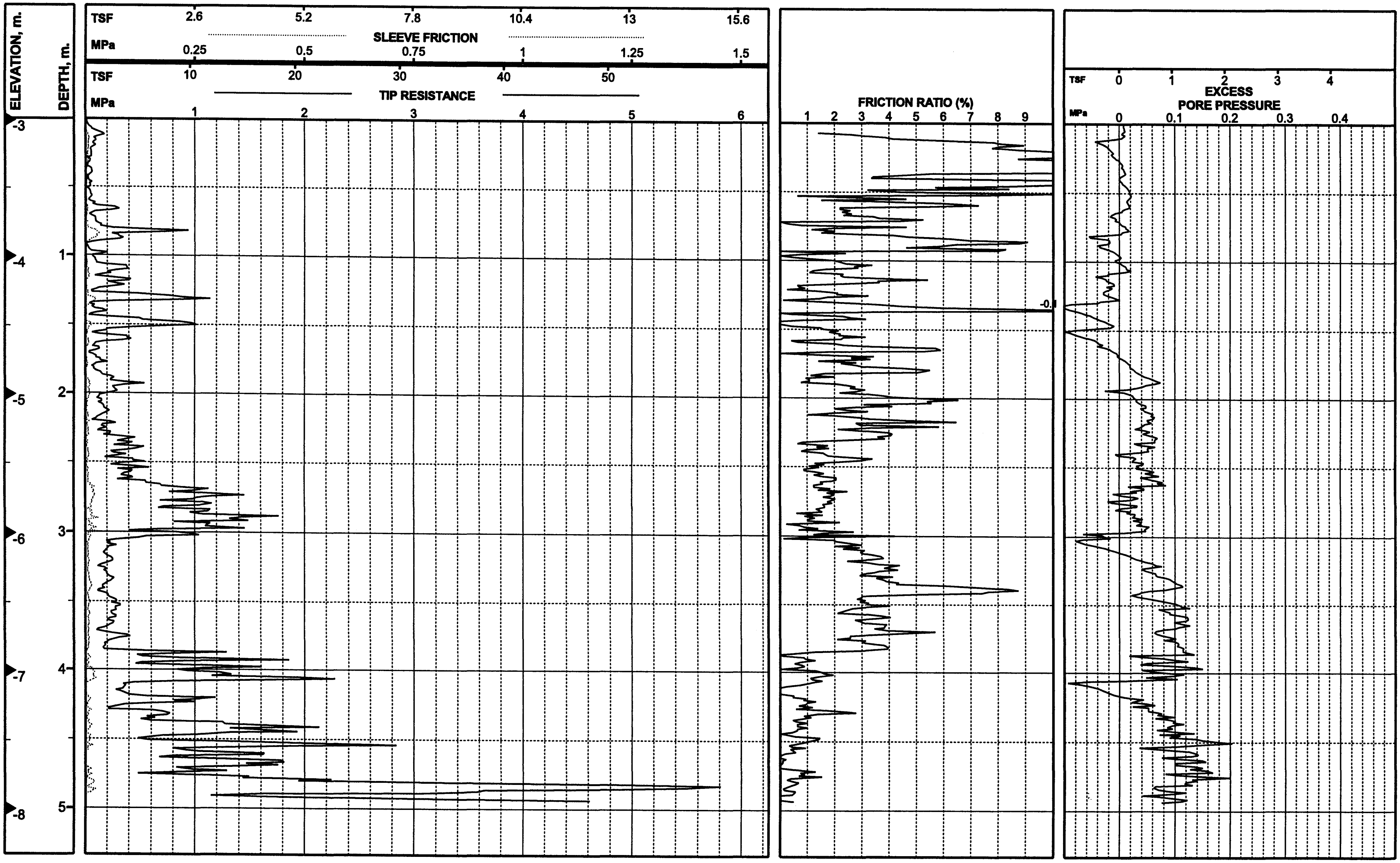
TETHERED SEASCOUT SOUNDING 98C-441

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PLATE 98-441

PROJECT NO:	98-42-0054	COORDINATES:	E1838679 N648295 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-442 (Skyway Frame 1)	MUDLINE ELEVATION:	-3.0 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-442
SFOBB East Span Seismic Safety Project

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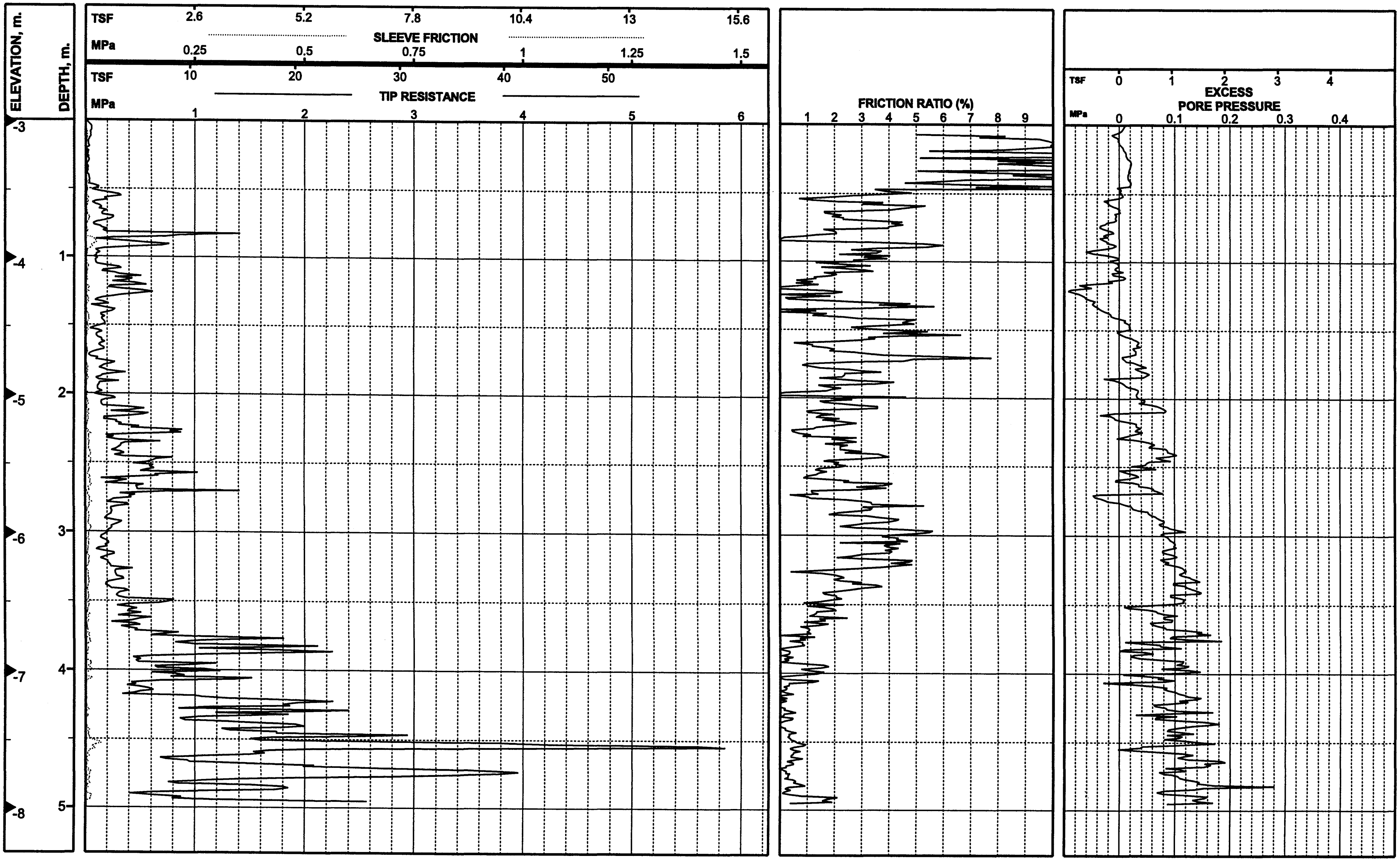
PROJECT NO:	98-42-0054	COORDINATES:	E1838688 N648279 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-443 (Skyway Frame 1)	MUDLINE ELEVATION:	-3.0 m (MSL)	TEST DATE:	12/15/98

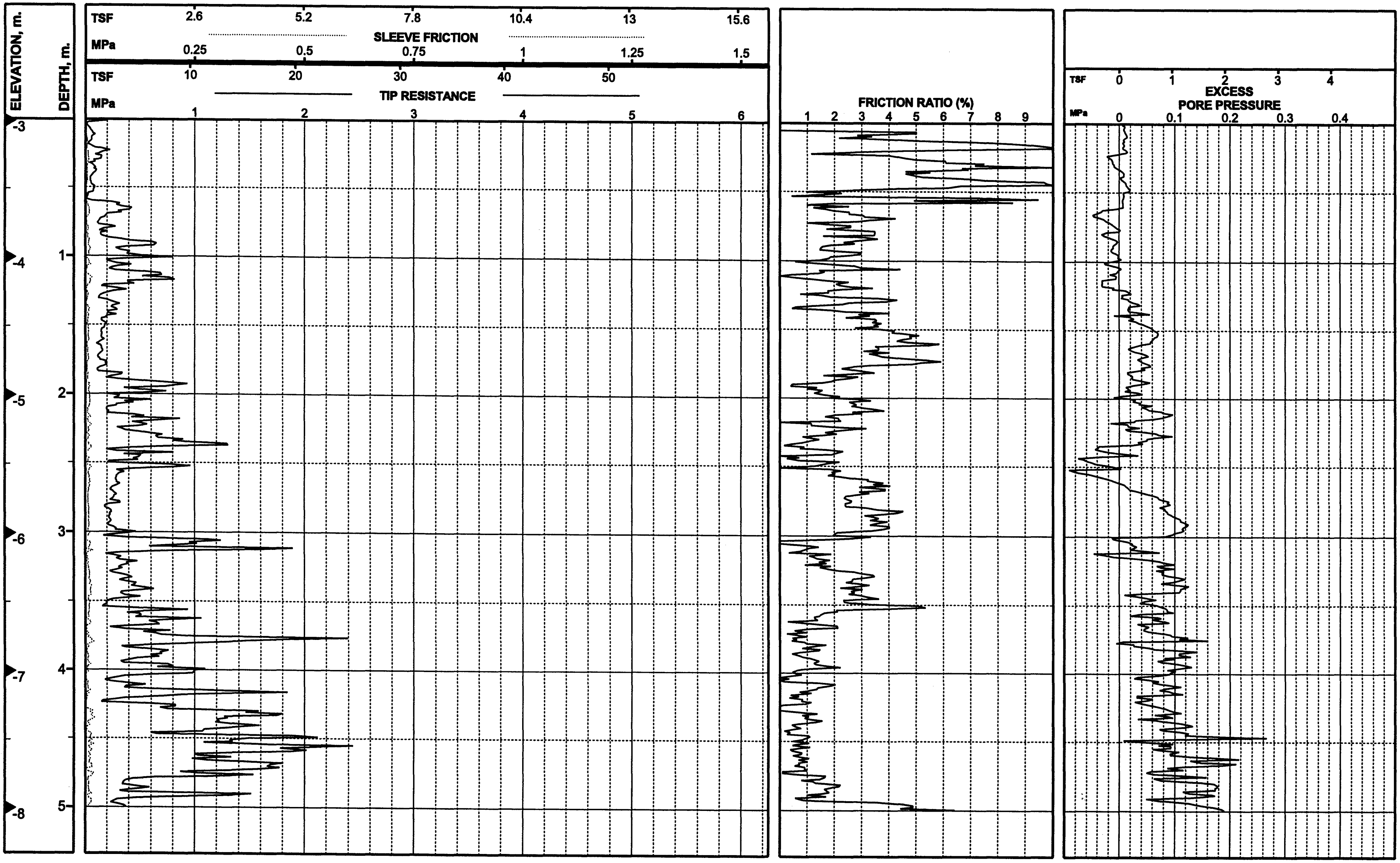


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-443
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838695 N648249 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-444 (Skyway Frame 5)	**MUDLINE ELEVATION:**	-3.0 m (MSL)	**TEST DATE:**	12/15/98

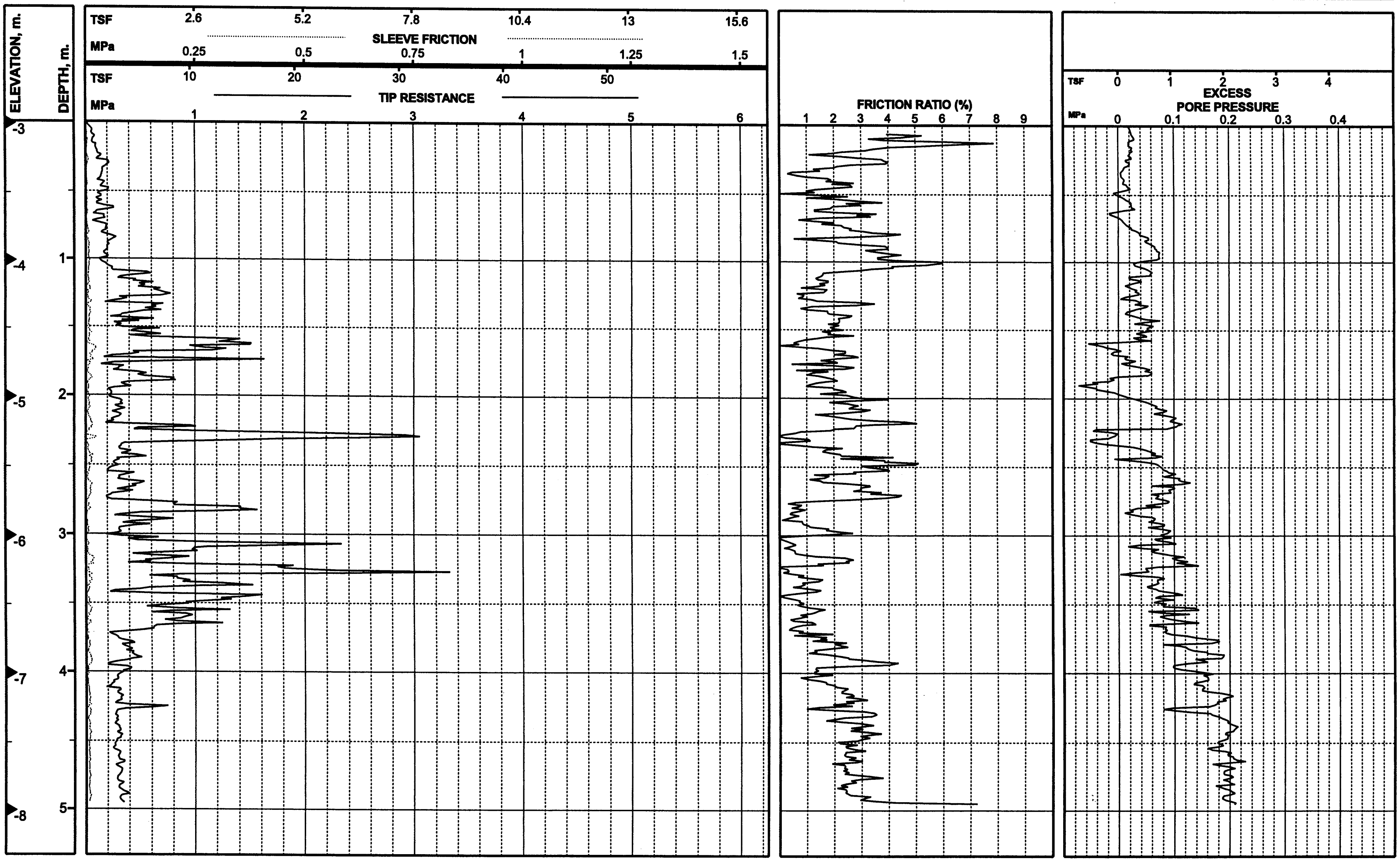


NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-444
SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	COORDINATES:	E1838701 N648206 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-445 (Skyway Frame 1)	MUDLINE ELEVATION:	-3.0 m (MSL)	TEST DATE:	12/15/98

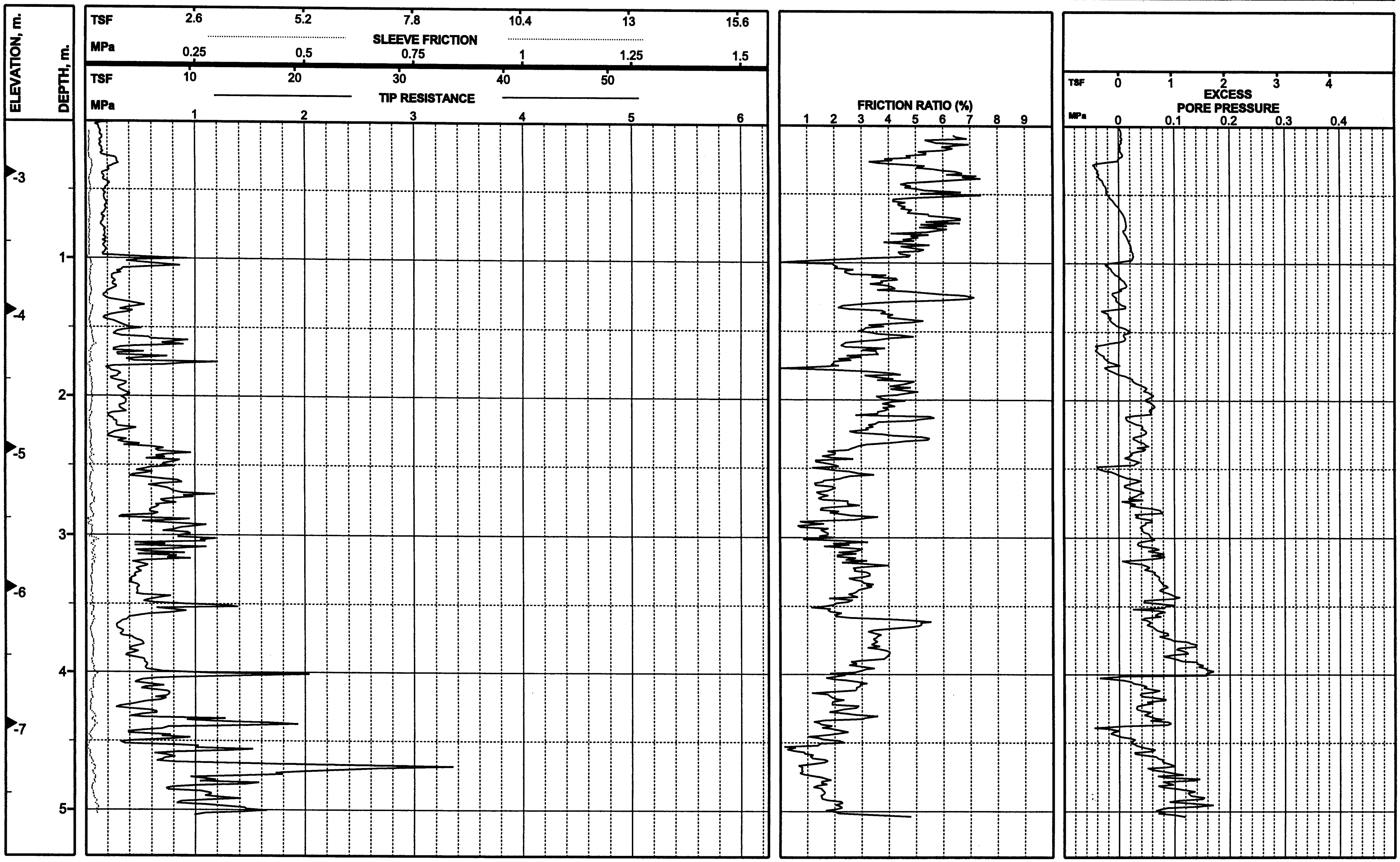


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-445
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1838757 N648272 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-446 (0m right W. Sta. 82+96)	MUDLINE ELEVATION:	-2.6 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

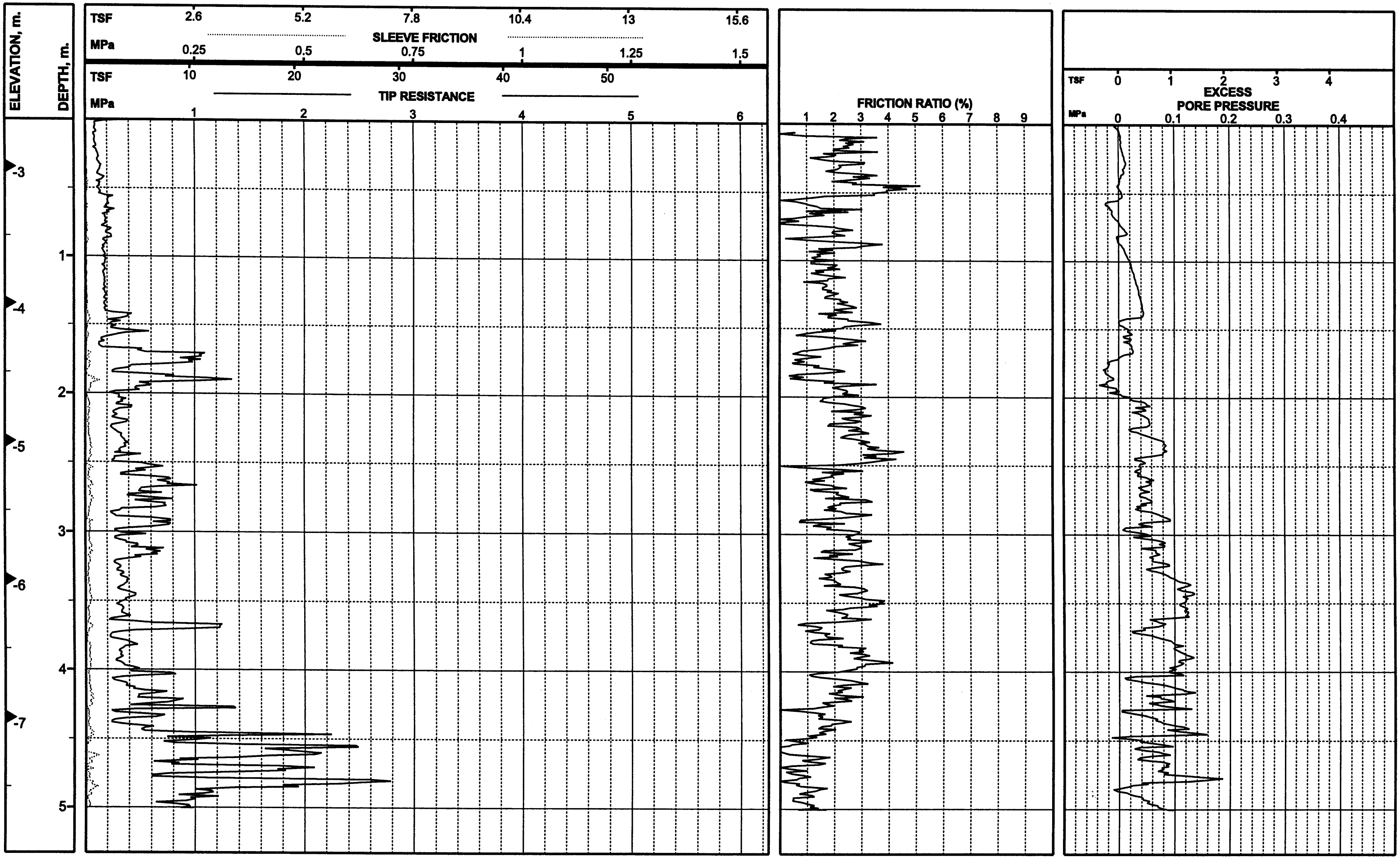
TETHERED SEASCOUT SOUNDING 98C-446

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PLATE 98-446

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838762 N648241 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-447 (8m left of E. Sta. 82+69)	**MUDLINE ELEVATION:**	-2.7 m (MSL)	**TEST DATE:**	12/15/98

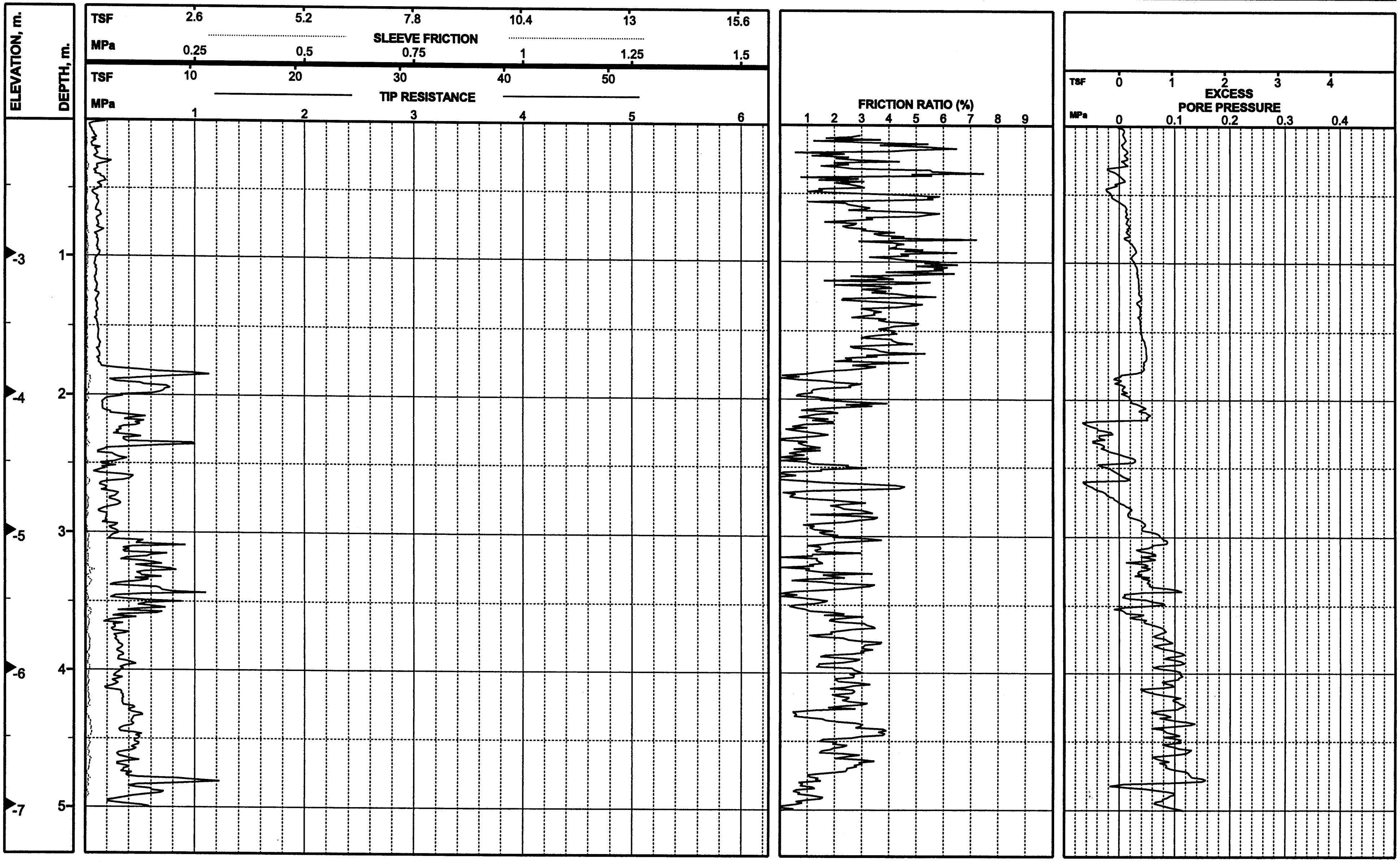


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-447
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO: 98-42-0054	**COORDINATES:** E1838808 N648270 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning
EXPLORATION NO.: 98C-448 (9m right of E. Sta. 83+47)	**MUDLINE ELEVATION:** -2.0 m (MSL)	**TEST DATE:** 12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

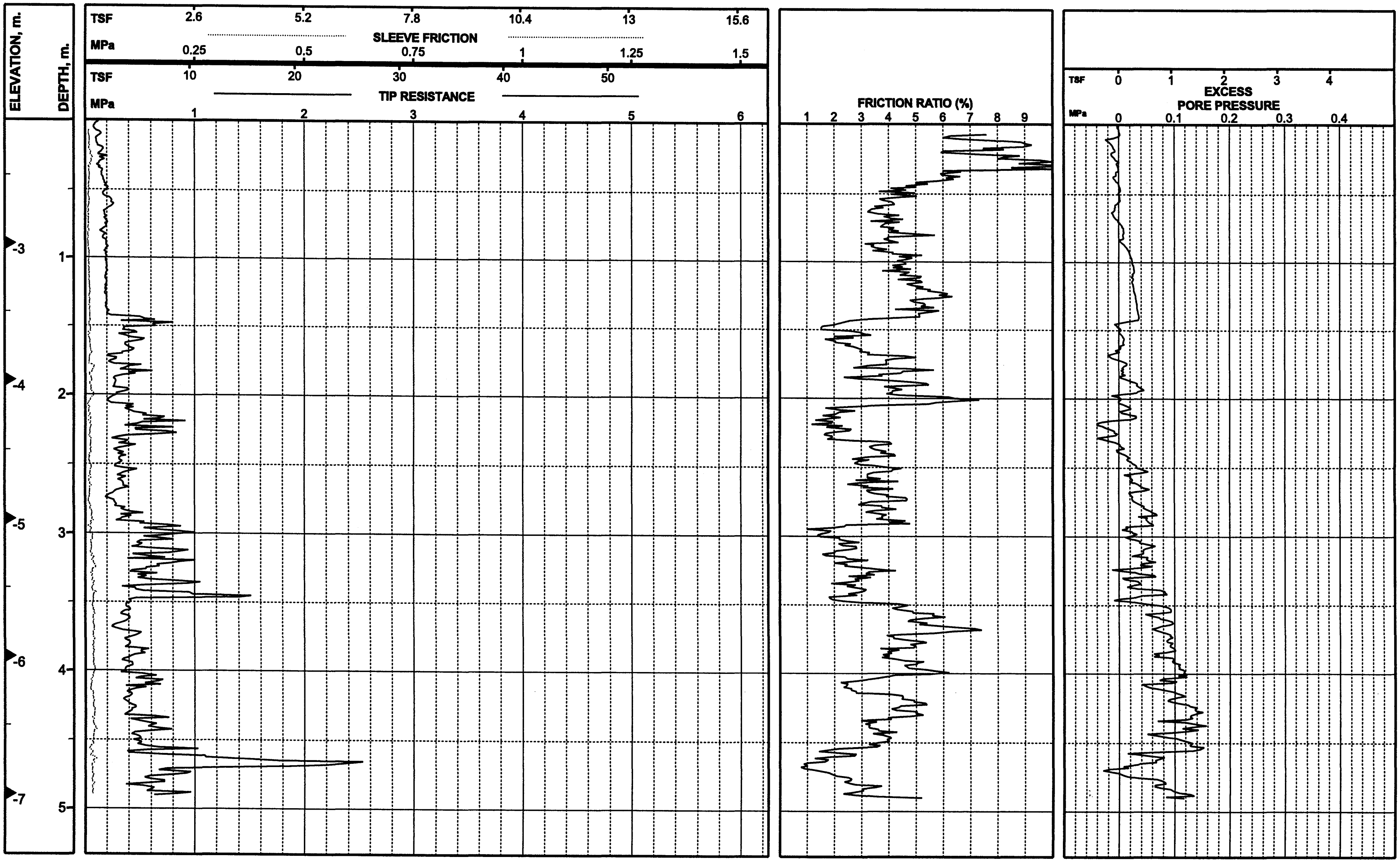
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-448

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	COORDINATES:	E1838807 N648239 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-449 (1m left of E. Sta. 83+13)	MUDLINE ELEVATION:	-2.1 m (MSL)	TEST DATE:	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

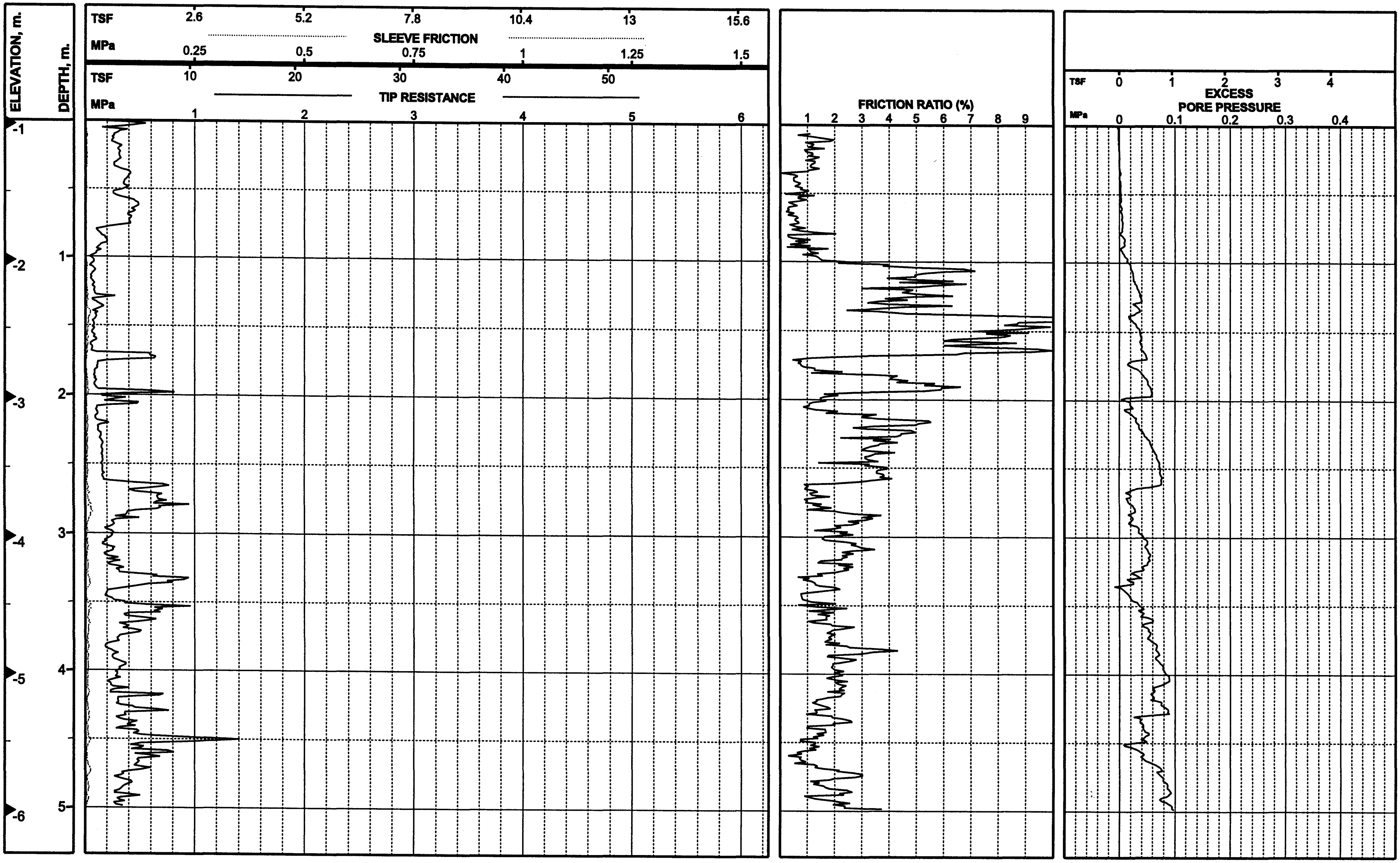
Report Date: 05/11/99

LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-449

SFOBB East Span Seismic Safety Project

PROJECT NO:	98-42-0054	COORDINATES:	E1838892 N648303 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-450 (14m left of W. Sta. 84+34)	MUDLINE ELEVATION:	-1.0 m (MSL)	TEST DATE:	12/17/98



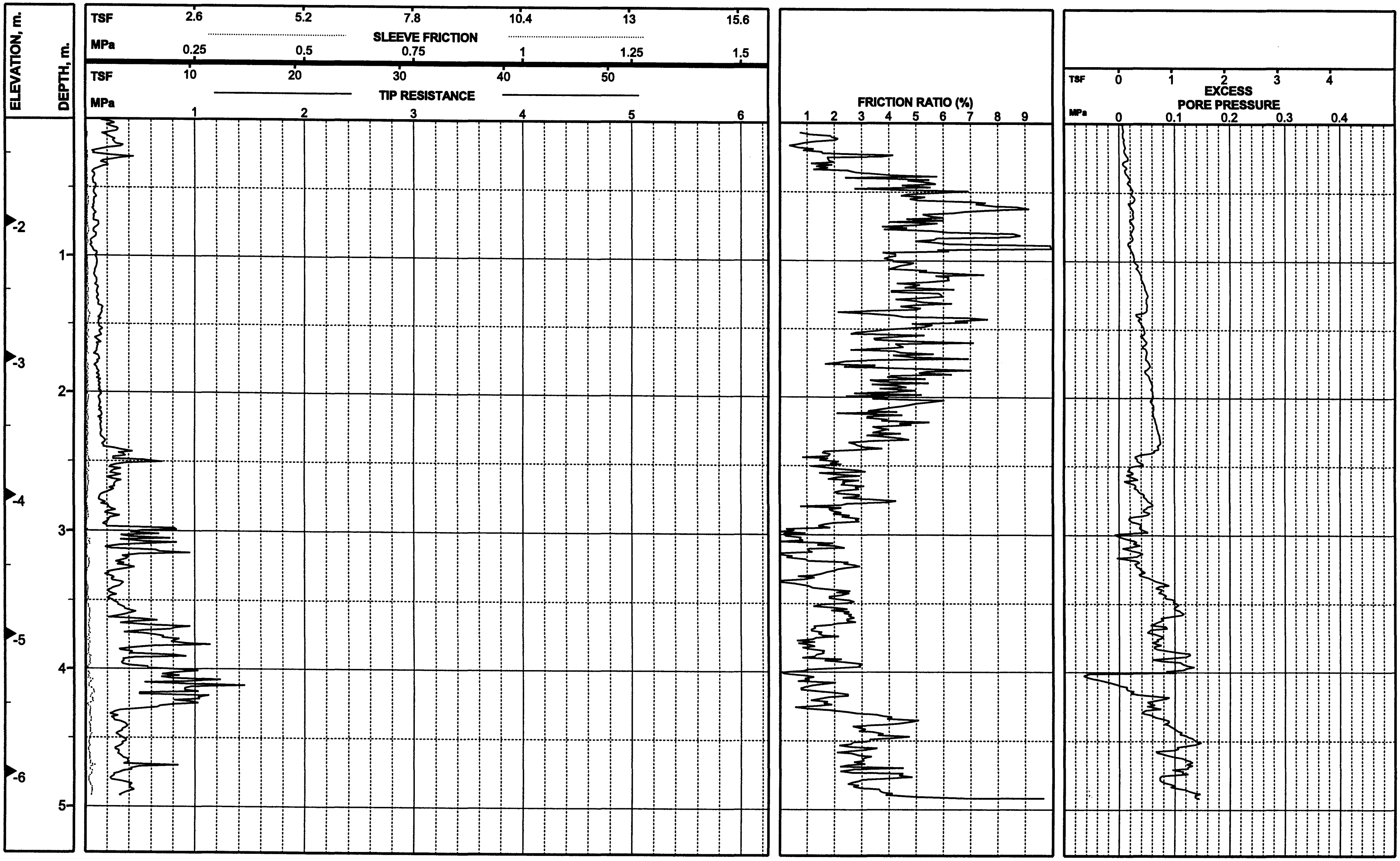
NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-450
SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

FUGRO

PROJECT NO:	98-42-0054	COORDINATES:	E1838855 N648246 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-451 (2m left of E. Sta. 83+61)	MUDLINE ELEVATION:	-1.2 m (MSL)	TEST DATE:	12/15/98

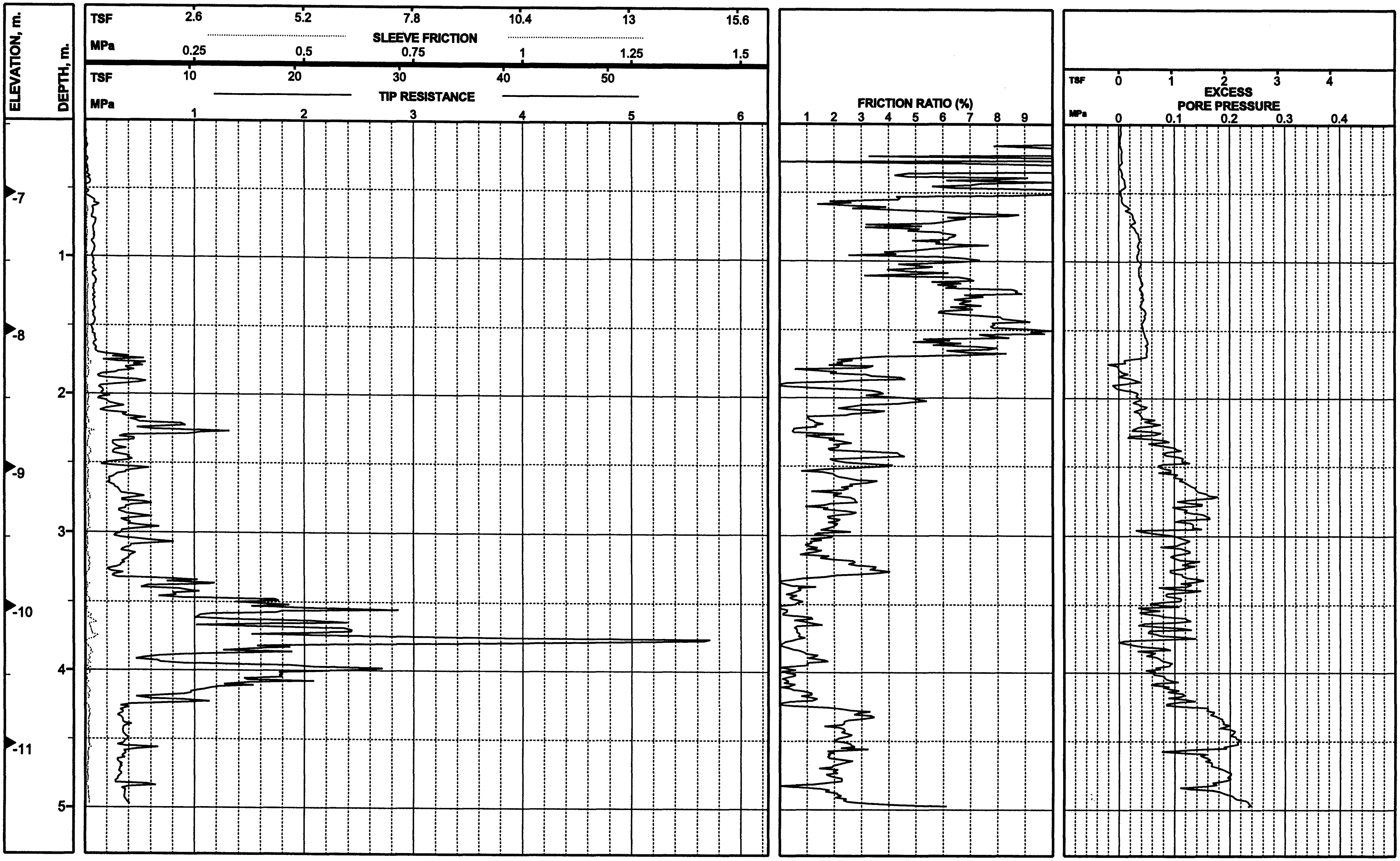


NOTE: SeaScout CPT uses 1 sq. cm cone

Report Date: 05/11/99

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-451
SFOBB East Span Seismic Safety Project

PROJECT NO: 98-42-0054	**COORDINATES:** E1837379 N648043 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning	
EXPLORATION NO.: 98C-452 (6m right of W. Sta. 69+00)	**MUDLINE ELEVATION:** -6.5 m (MSL)	**TEST DATE:** 12/15/98	



NOTE: SeaScout CPT uses 1 sq. cm cone

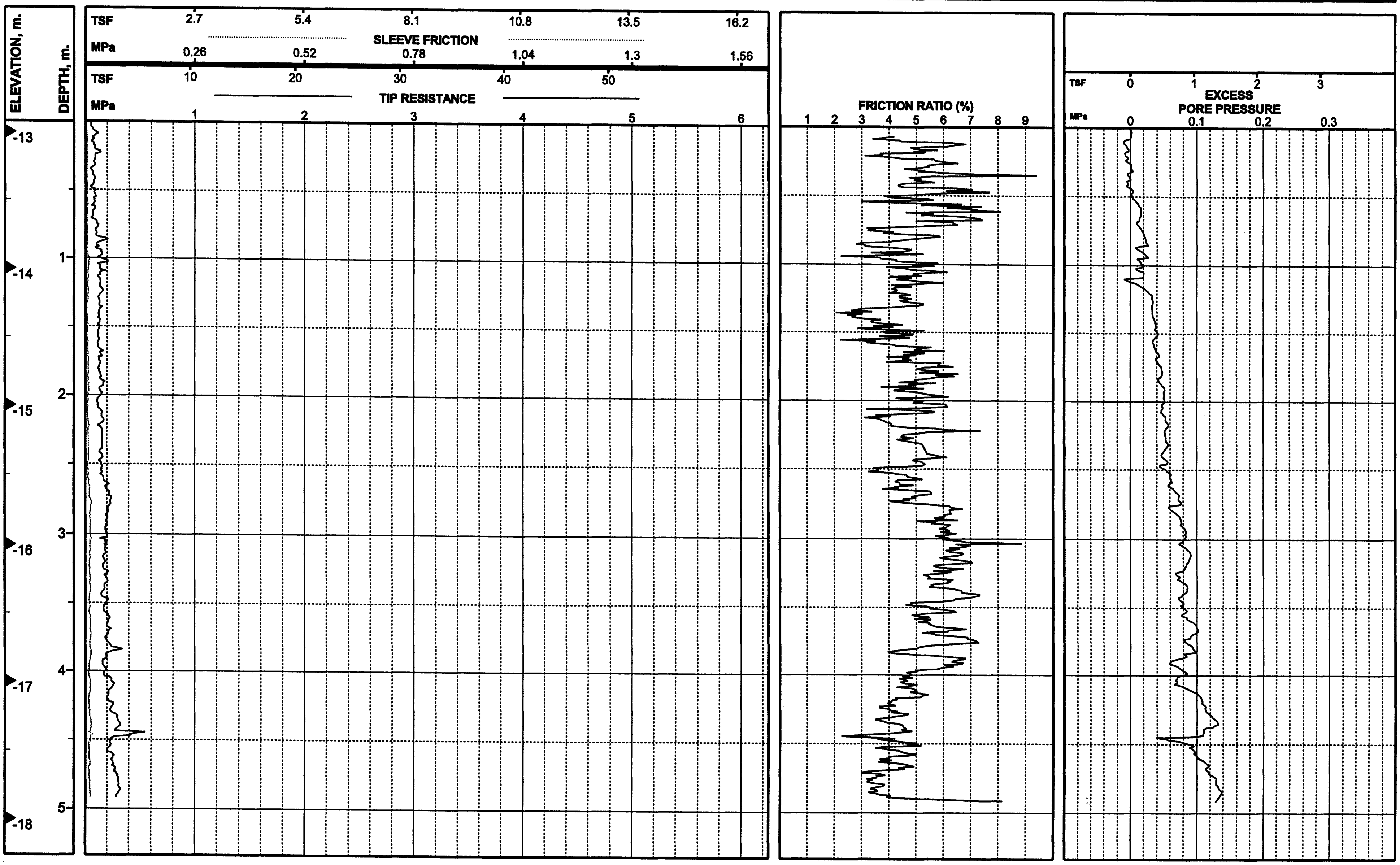
LOG OF CPT

TETHERED SEASCOUT SOUNDING 98C-452

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1836672 N647779 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-453 (Skyway Frame 1)	**MUDLINE ELEVATION:**	-12.9 m (MSL)	**TEST DATE:**	12/17/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

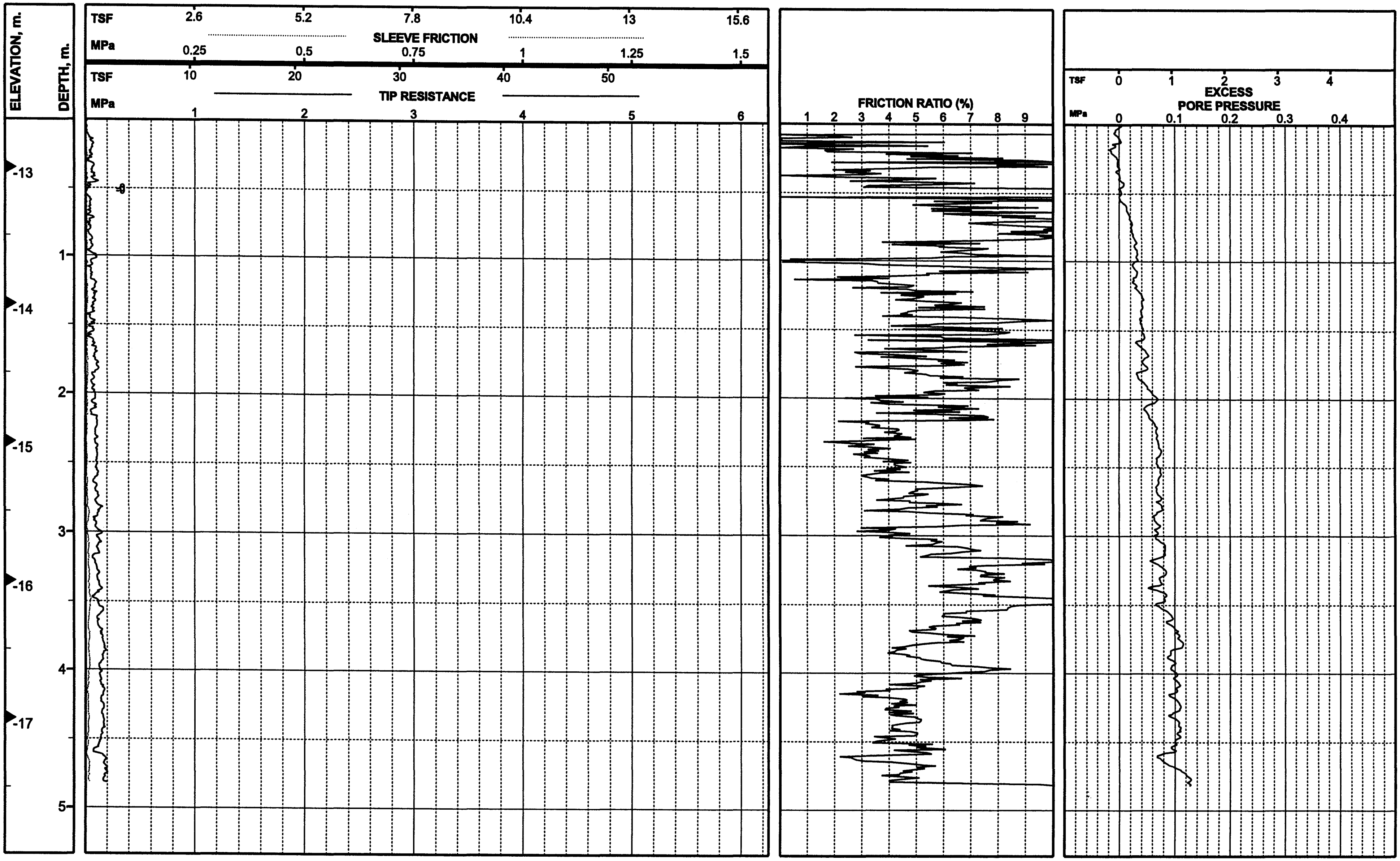
TETHERED SEASCOUT SOUNDING 98C-453

SFOBB East Span Seismic Safety Project

Report Date: 05/14/99

PLATE 98-453

PROJECT NO:	98-42-0054	COORDINATES:	E1836713 N647815 (CA State Plane Zone 3, NAD83, Meters)	VESSEL:	MV White Lightning
EXPLORATION NO.:	98C-454 (Skyway Frame 1)	MUDLINE ELEVATION:	-12.6 m (MSL)	TEST DATE:	12/18/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT

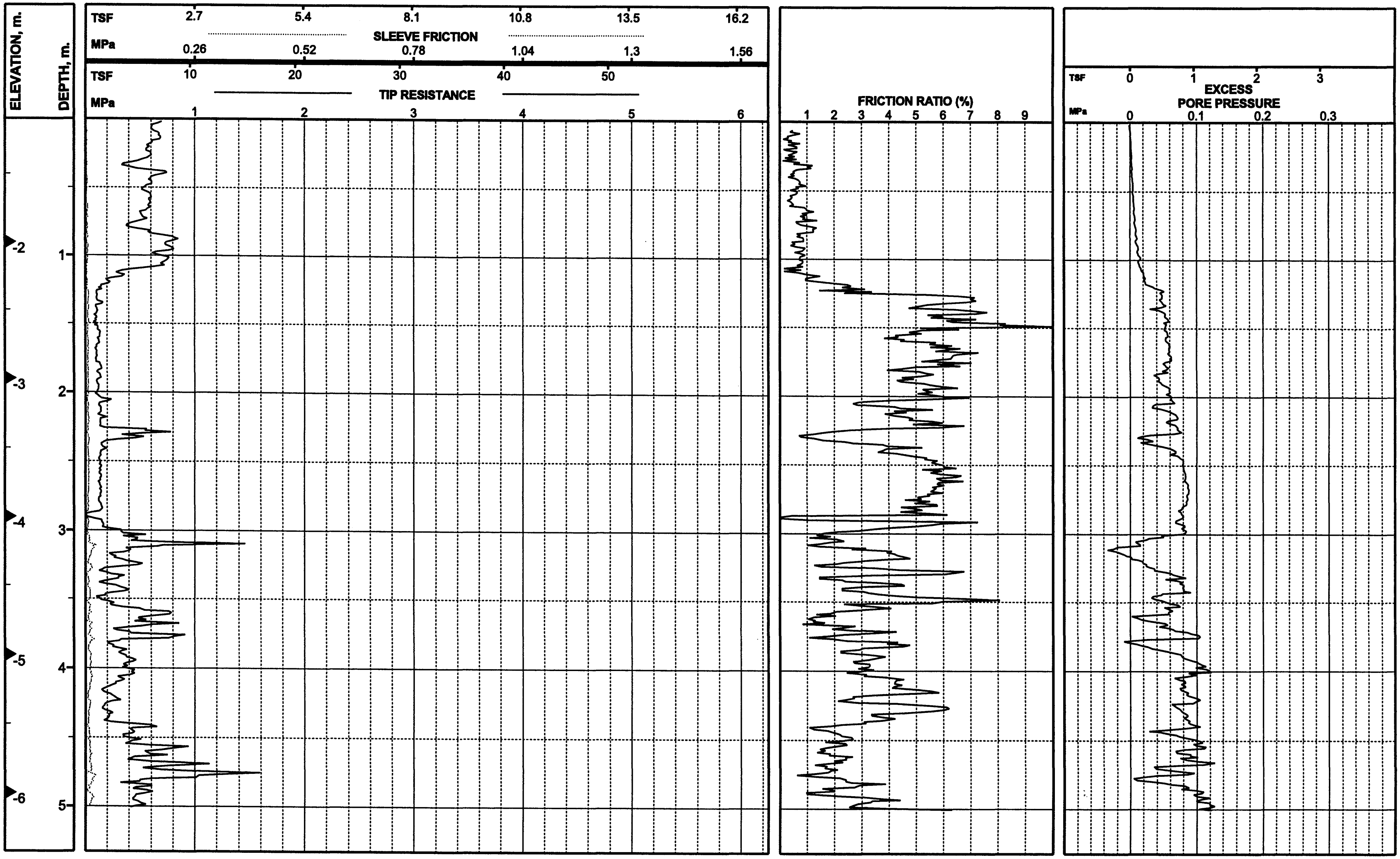
TETHERED SEASCOUT SOUNDING 98C-454

SFOBB East Span Seismic Safety Project

Report Date: 05/11/99

FUGRO

PROJECT NO: 98-42-0054	**COORDINATES:** E1838909 N648295 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightning
EXPLORATION NO.: 98C-501 (4m left of W. Sta. 84+50)	**MUDLINE ELEVATION:** -1.1 m (MSL)	**TEST DATE:** 12/15/98

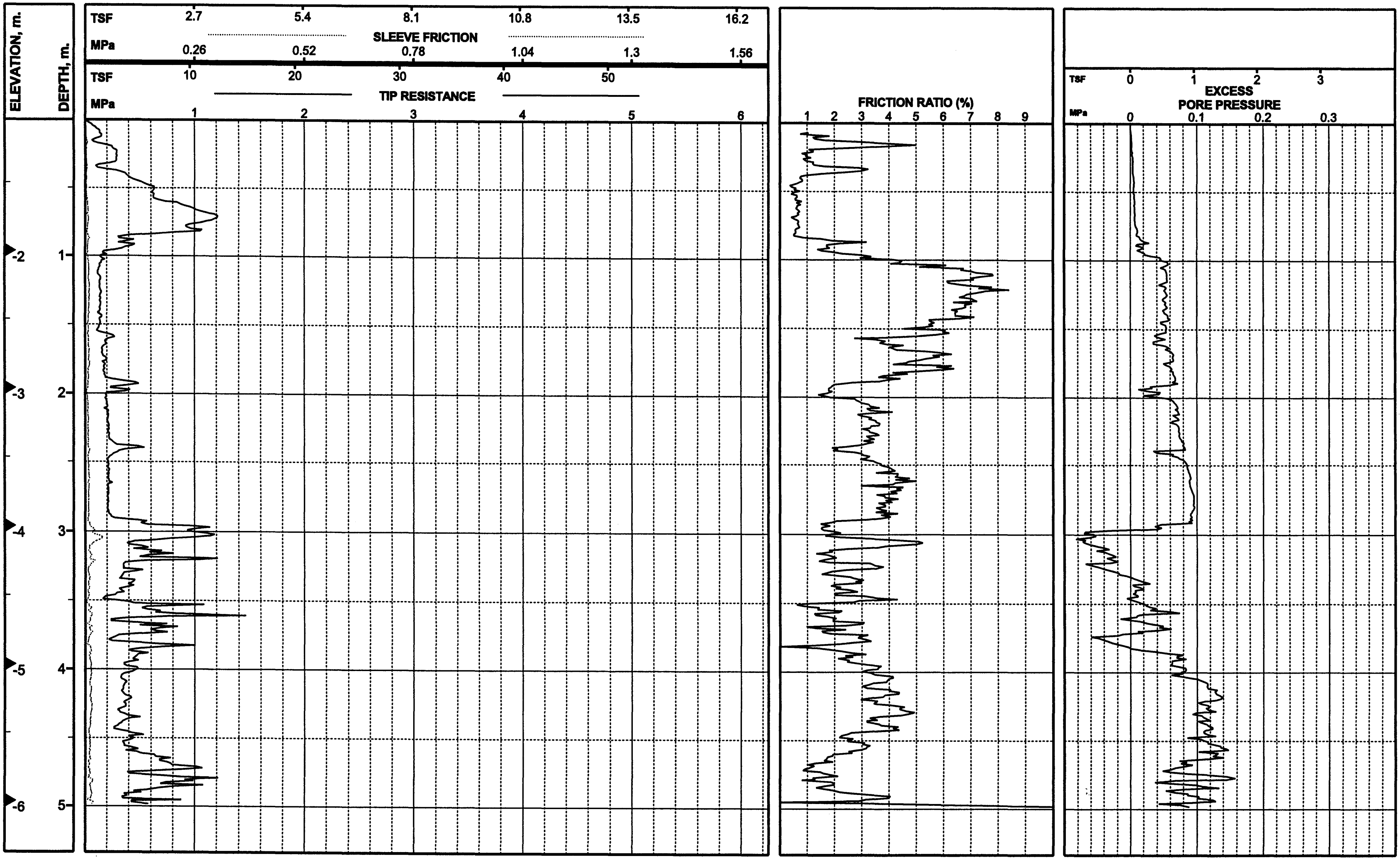


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-501
SFOBB East Span Seismic Safety Project

Report Date: 05/14/99

PROJECT NO: 98-42-0054	**COORDINATES:** E1838943 N648302 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:** MV White Lightening
EXPLORATION NO.: 98C-505 (7m left of W. Sta. 84+84)	**MUDLINE ELEVATION:** -1.0 m (MSL)	**TEST DATE:** 12/15/98

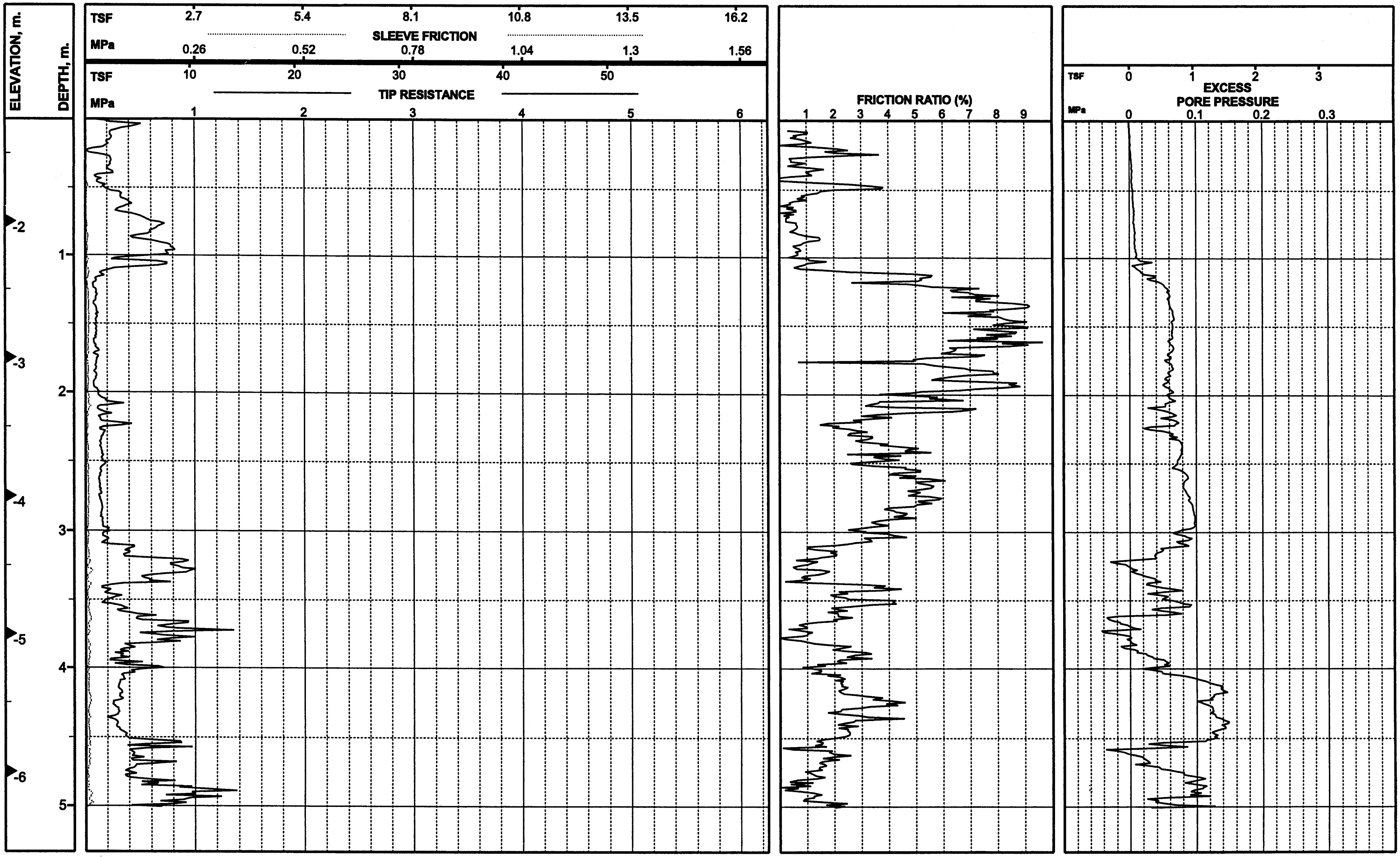


NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-505
SFOBB East Span Seismic Safety Project

Report Date: 05/14/99

PROJECT NO:	98-42-0054	**COORDINATES:**	E1838935 N648297 (CA State Plane Zone 3, NAD83, Meters)	**VESSEL:**	MV White Lightning
EXPLORATION NO.:	98C-506 (3m left of W. Sta. 84+76)	**MUDLINE ELEVATION:**	-1.2 m (MSL)	**TEST DATE:**	12/15/98



NOTE: SeaScout CPT uses 1 sq. cm cone

LOG OF CPT
TETHERED SEASCOUT SOUNDING 98C-506
SFOBB East Span Seismic Safety Project

Report Date: 05/14/99

FUGRO